DETERMINANTS

SSR

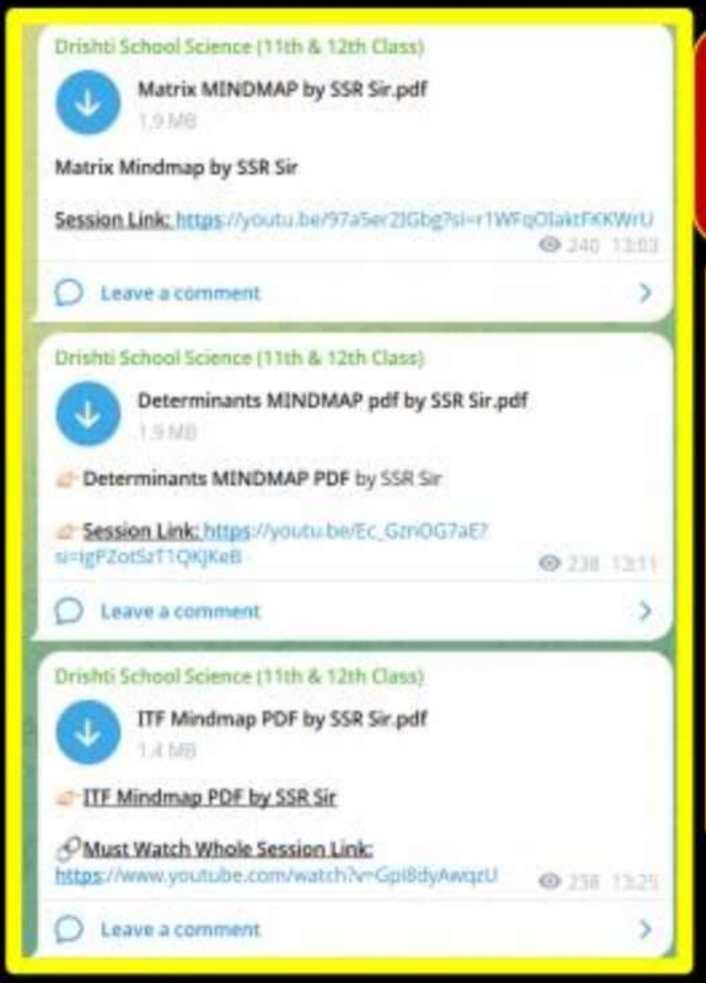
ONE SHOT

FULL CHAPTER

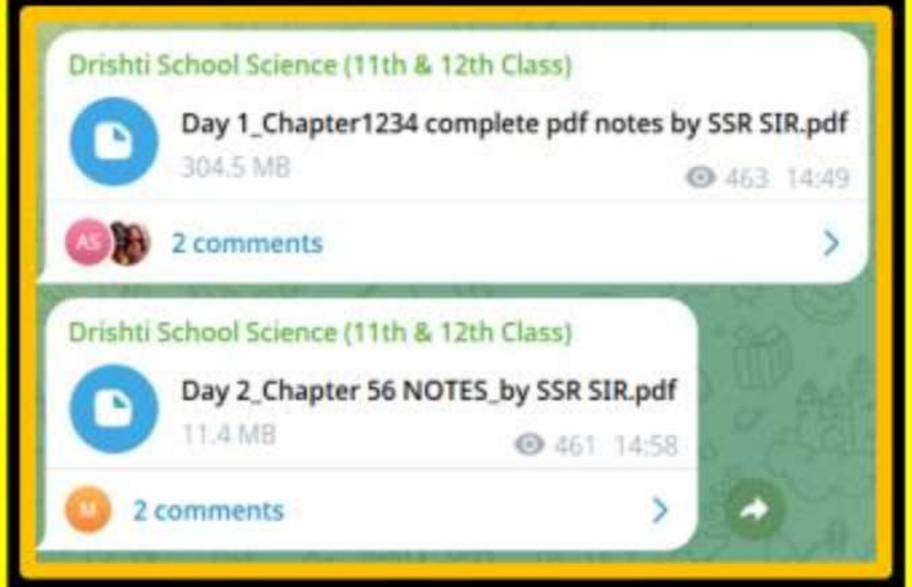
100% Yahi Se Paper Banega



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ABOUT Determinants

- Weightage in CUET: 25-30marks (35-40)
- Weightage in Class 12th (10) M+D

- What resources you should follow:
- BPPT 5.0 only (6.0)
- This PPT Content

- Importance of Chapter:
  - Cost benefit ratio high
  - Easy and quick
  - No Basics required
  - Highest weightage

By- SSR Sir

Syllabus Covered

Chapter	Chapter Name	Syllabus	Deleted Syllabus
Chapter 4	Determinants	1. Determinants of 2*2 and 3*3 Matrix 2. Minor and cofactor 3. Properties of Determinants 4. Singular and Non-singular matrix 5. Adjoint of a matrix and their properties 6. Inverse of a matrix and their properties 7. Area of the triangle 8. Collinearity 9. Solution of equation by matrix method	→ Addition property → Multiplication property → Elementary Transformation in determinants → Equation of line by the determinant's method 2026 (10-15)Q

Topics *to be covered*

Theory + Practice

1. Determinants of 2*2 and 3*3
2. Minor and co-factor of a determinants
3. Properties of determinants
4. Some IMP Properties of Determinants

1. Adjoint of a matrix & Properties
2. Inverse of a matrix & Properties
3. Area of triangle & Collinearity
4. Solution of equation by the matrix method

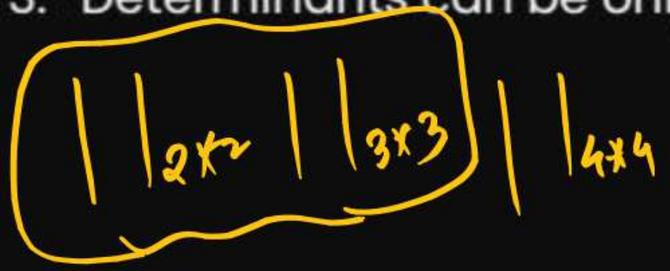
Matrices VS Determinants



1. Matrix is an arrangement, that comes from real life problems
2. Matrix does not have value
3. Matrix can be rectangular & square both



1. Determinants is a tool that can be used at any where required
2. Determinants have value
3. Determinants can be only square.





Determinants of 2*2 Order

$$\begin{vmatrix} a_1 & b_1 \\ a_2 & b_2 \end{vmatrix} \Rightarrow (a_1)(b_2) - (b_1)(a_2)$$

- A determinant of second order consist of two rows and two columns

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Question: CUET 2026 PYQs

If $\begin{vmatrix} 5 & -4 \\ 5 & 4 \end{vmatrix} = \begin{vmatrix} 8 & x^2 \\ -x & -3 \end{vmatrix}$ then the value of x is:

$20 + 20 = -24 + x^3$

$40 + 24 = x^3$

$64 = x^3$

$x = 4$

A -4

B 16

C 4

D 64

Question: CUET 2026 PYQs

The value of $\begin{vmatrix} 1 & \log_b a \\ \log_a b & 1 \end{vmatrix}$ is:

$$\log_a b = \frac{\log b}{\log a}$$

$$1 - [\log_b a] \cdot [\log_a b]$$

$$\Rightarrow 1 - \left(\frac{\log a}{\log b}\right) * \left(\frac{\log b}{\log a}\right)$$

$$\Rightarrow 1 - 1$$

$$\Rightarrow 0$$

A. 1

B. $\log_b a$

C. $\log_a b$

D. 0 ✓

Question: CUET 2026 PYQs

If $\begin{vmatrix} x & 2 \\ 18 & x \end{vmatrix} = \begin{vmatrix} 6 & 2 \\ 18 & 6 \end{vmatrix}$, then x equals:

$x^2 - 36 = 36 - 36$

$x = \pm 6$

A) 0

B) 6

C) -6

D) ± 6

Question: CUET 2026 PYQs

The value of $\Delta = \begin{vmatrix} 2\sin 40^\circ & 2\sin 50^\circ \\ -3\cos 40^\circ & 3\cos 50^\circ \end{vmatrix}$ is:

$\sin A \cdot \cos B \pm \cos A \cdot \sin B = \sin(A \pm B)$

$6 \sin 40^\circ \cdot \cos 50^\circ + 6 \cos 40^\circ \cdot \sin 50^\circ$

$6\left[\sin(40^\circ + 50^\circ)\right]$

$\Rightarrow 6 \cdot 1$

$\Rightarrow 6$

A. 0

B. 4

C. 1

D. 6 ✓

Question: CUET 2026 PYQs

The determinant of which of the following matrices is a perfect square ?

A. $\begin{bmatrix} 5 & 29 \\ -1 & 6 \end{bmatrix}$ $\Rightarrow 30 + 29 = 59$

B. $\begin{bmatrix} 5 & 26 \\ 1 & 6 \end{bmatrix}$ $\Rightarrow 30 - 26 \Rightarrow 4 = 2^2$

C. $\begin{bmatrix} 10 & 3 \\ 17 & 10 \end{bmatrix}$ $|\ | 100 - 51 \Rightarrow 49 = 7^2$

D. $\begin{bmatrix} 8 & 5 \\ -3 & -8 \end{bmatrix}$ -64

$\begin{pmatrix} 4 \\ 9 \\ 16 \\ 25 \\ 36 \end{pmatrix}$

Choose the correct answer from the options given below:

(A) A, B and C only

(B) B and D only

(C) B and C only

(D) A, C and D only

Question: CUET 2026 PYQs

If $\begin{vmatrix} 2x & 2 \\ 8 & x \end{vmatrix} = \begin{vmatrix} -4 & -2 \\ 4 & -2 \end{vmatrix}$ then $x =$

$2x^2 - 16 = 8 + 8$

$2x^2 = 32$

$x^2 = 16$

$x = \pm 4$

A) 4

B) ± 4

C) -2

D) -4

Question: CUET 2026 PYQs

If $\begin{vmatrix} 8 & -4 \\ 5 & -2 \end{vmatrix} = \begin{vmatrix} x & 6 \\ 2 & 2x \end{vmatrix}$, then $|x|$ is equal to

$-16+20 = 2x^2-12$

$x^2 = 8$

$x = \pm\sqrt{8}$

A 8

B -8

C $\sqrt{8}$

D 2

Question: CUET 2026 PYQs

If $XA = (I - A)^2$ where X, A and I are 2×2 matrices and $A = \begin{bmatrix} 1 & 2 \\ 1 & 4 \end{bmatrix}$, then $|X| =$

A $2|A|$

B $\frac{4}{|A|}$

C $|A|^2$

D $\frac{2}{|A|}$

Question: CUET 2026 PYQs

The value of $\begin{vmatrix} \log_3 16 & \log_5 9 \\ \log_3 25 & \log_4 27 \end{vmatrix} + \begin{vmatrix} \log_3 4 & \log_3 4 \\ \log_2 3 & \log_2 9 \end{vmatrix}$ is :

(A) 0

(B) 4

(C) 2

(D) 6

$$(\log_3 16)\cdot(\log_4 27) - (\log_5 9)\cdot(\log_3 25)$$

$$(\log_3 4^2)(\log_4 3^3) - (\log_5 3^2)\cdot(\log_3 5^2)$$

$$2\left[\frac{\log 4}{\log 3} * \frac{3\log 3}{\log 4}\right] - 2\left(\frac{\log 3}{\log 5}\right)\left(\frac{2\log 5}{\log 3}\right)$$

$$6 - 4 \Rightarrow (2)$$

$\log a^b = b \log a$

$\log_{(a^b)} c = \frac{1}{b}\log_a c$

$\log_{(a^b)}(c^d) \Rightarrow \frac{d}{b}\log_a c$

$\log_{a^b} = \frac{\log_b}{\log_a}$

Question: CUET 2026 PYQs

The value of $\begin{vmatrix} \log_3 16 & \log_5 9 \\ \log_3 25 & \log_4 27 \end{vmatrix} + \begin{vmatrix} \log_3 4 & \log_3 4 \\ \log_2 3 & \log_2 9 \end{vmatrix}$ is :

- A 0
- B 4
- C 2
- D 6

$(\log_3 4)(\log_2 9) - (\log_3 4)(\log_2 3)$

$\left(\log_{3^2} 2^2\right)\left(\log_{2^2} 3^2\right) - \left(\log_{3^2} 2^2\right)\left(\log_{2^2} 3\right)$

$2\left(\frac{\log 2}{\log 3}\right)\left(2\frac{\log 3}{\log 2}\right) - 2\left(\frac{\log 2}{\log 3}\right)\left(\frac{\log 3}{\log 2}\right)$

$\Rightarrow (4-2)$

$\Rightarrow 2$

$\log a^b = b \log a$

$\log_{(a^b)} c = \frac{1}{b} \log_a c$

$\log_{(a^b)} (c^d) \Rightarrow \frac{d}{b} \log_a c$

$\log_{a^b} = \frac{\log_y b}{\log_y a}$

Question: CUET 2026 PYQs

Value of the determinant $\begin{vmatrix} \log_3 512 & \log_4 3 \\ \log_3 8 & \log_4 9 \end{vmatrix}$ **is**

- A 15
- B 15/2
- C 21/2
- D 21

$$(\log_3 512)(\log_4 9) - (\log_4 3)(\log_3 8)$$

$$\left(\log_3 2^9\right)\left(\log_2 2^3\right) - \left(\log_2 2^3\right)\left(\log_3 2^3\right)$$

$$9\cdot\left(\frac{\log 2}{\log 3}\right)\frac{1}{2}\frac{\log 3}{\log 2} - \frac{1}{2}\left(\frac{\log 3}{\log 2}\right)3\cdot\frac{\log 2}{\log 3}$$

$$9 - \frac{3}{2} \Rightarrow 15/2$$

Question: CUET 2026 PYQs

If $x \in N$ (Set of Natural Numbers) and $\begin{vmatrix} x+3 & -2 \\ -3x & 2x \end{vmatrix} = 8$, then the value of x is

A -2

B 2

C ± 2

D 1

$2x(x+3) - 6x = 8$

$2x^2 + 6x - 6x = 8$

$x^2 = 4$

$x = \pm 2$

$x = 2 \in N$

$x = -2 \notin N$

$N = \{1, 2, 3 \dots\}$

$Z = \{0, \pm 1, \pm 2 \dots\}$

Question: CUET 2026 PYQs

If $\begin{vmatrix} 3 & x \\ x & 1 \end{vmatrix} = \begin{vmatrix} 3 & 2 \\ 4 & 1 \end{vmatrix}$, then value of x is/are

(A) $x = 2$
(B) $x = -2$
(C) $x = 2\sqrt{2}$
(D) $x = -2\sqrt{2}$

Choose the correct answer from the options given below:

$3 - x^2 = 3 - 8$

$x = \pm 2\sqrt{2}$

A (A) only

B (B) and (D) only

C (C) and (D) only

D (A), (C) and (D) only

Question: CUET 2026 PYQs

If $\begin{vmatrix} 4x & 9 \\ -4 & -5 \end{vmatrix} = \begin{vmatrix} 4 & 8 \\ 2 & 3 \end{vmatrix}$, then the value of x is:



A) 1

B) 3

C) 2

D) 5

Question: CUET 2026 PYQs

If $\begin{vmatrix} 6 & 7 \\ 3 & 8 \end{vmatrix} = \begin{vmatrix} 3x & 6 \\ -1 & x \end{vmatrix}$, then the sum of values of x is equal to

A 7

B $2\sqrt{7}$

C 21

D 0

QUESTION- 6 [1 MARKS]

Q. Value of the determinant $\begin{vmatrix} \cos 67^\circ & \sin 67^\circ \\ \sin 23^\circ & \cos 23^\circ \end{vmatrix}$ is

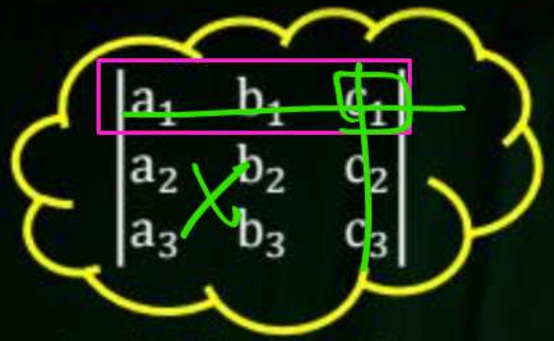
A. 0

B. $\frac{1}{2}$

C. $\frac{\sqrt{3}}{2}$

D. 1

Determinants of 3*3 Order



- A determinant of third order consists of three rows and three columns.

Question: CUET 2026 PYQs

(2025)

If $\begin{vmatrix} 1 & -2 & 5 \\ 2 & \lambda & -1 \\ 0 & 4 & 2\lambda \end{vmatrix} = 86$, the sum of the values of λ is:

$1[2\lambda^2+4] + 2[4\lambda] + 3[8] = 86$

A) 4

B) -4

C) 1

D) -1

$2\lambda^2 + 4 + 8\lambda + 40 = 86$

44

$2\lambda^2 + 8\lambda - 42 = 0$

$\lambda^2 + 4\lambda - 21 = 0$

α, β

$\alpha + \beta = \frac{-4}{1} = -4$

$\lambda^2 + 7\lambda - 3\lambda - 21 = 0$

$(\lambda+7)(\lambda-3) = 0$

$\lambda = -7; \lambda = 3$

Sum $= -4$

Note:

For Quad Eqn

$ax^2+bx+c=0 \begin{cases} \alpha \\ \beta \end{cases}$

S.O.R: $\alpha+\beta = -\frac{b}{a} = \frac{-[\text{Coff of } x]}{\text{Coff of } x^2}$

P.O.R $\alpha\cdot\beta = \frac{c}{a} = \frac{(\text{Const})}{\text{Coff of } x^2}$

(II) For Cubic Eqn

$ax^3+bx^2+cx+d=0 \begin{cases} \alpha \\ \beta \\ \gamma \end{cases}$

* S.O.R: $\alpha+\beta+\gamma = \frac{-\text{Coff of } x^2}{\text{Coff of } x^3} = \frac{-b}{a}$

* $\alpha\beta+\beta\gamma+\gamma\delta = \frac{c}{a} = \frac{[\text{Coff of } x]}{\text{Coff of } x^3}$

* P.O.R $\alpha\beta\gamma = \frac{-d}{a} = \frac{-\text{Const}}{\text{Coff of } x^3}$

Question: CUET 2026 PYQs

2022 – 2026 (2026 → 3/4 Vars)

If α, β, γ are the roots of $x^3 + mx + n = 0$ then the value of $\begin{vmatrix} 1+\alpha & 1 & 1 \\ 1 & 1+\beta & 1 \\ 1 & 1 & 1+\gamma \end{vmatrix}$ is :

$\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma} = ?$

$(1+\alpha)\left[(1+\beta)(1+\gamma)-1\right] - 1\left[\gamma+\gamma-1\right] + 1\left[1-1-\beta\right]$

$\Rightarrow (1+\alpha)\left[1+\gamma+\beta+\beta\gamma-1\right] - \gamma - \beta$

$\Rightarrow \gamma + \beta + \beta\gamma + \alpha\gamma + \alpha\beta + \alpha\beta\gamma - \gamma - \beta$

$\Rightarrow \alpha\beta + \beta\gamma + \gamma\alpha + \alpha\beta\gamma$

$m - n$

$\alpha+\beta+\gamma = 0$

$\alpha\beta+\beta\gamma+\gamma\alpha = m$

$\alpha\beta\gamma = -n$

(A) $m+n+2$

(B) $m-n-2$

(C) $m+n$

(D) $m-n$ ✓

(5) $\begin{vmatrix} & & \\ & & \\ & & \end{vmatrix} = 0$

$\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma} = ?$ (2022 - 2025)

$\alpha\beta + \beta\gamma + \gamma\alpha + \alpha\beta\gamma = 0$

$\alpha\beta + \beta\gamma + \gamma\alpha = -\alpha\beta\gamma$

$\frac{\alpha\beta}{\alpha\beta\gamma} + \frac{\beta\gamma}{\alpha\beta\gamma} + \frac{\gamma\alpha}{\alpha\beta\gamma} = -1$

$\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma} = -1$

Question: CUET 2026 PYQs

If $\Delta = \begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix}$, Then

Match List-I with List-II

$\alpha\beta\delta + \alpha\beta\gamma + \beta\gamma\delta + \gamma\alpha\delta$

$1+1+1+1 \Rightarrow 4$

List-I	List-II
Values of a, b & c	value of Δ
(A). a = b = c = 1	(I). 2
(B). a = -1, b = 1, c = 1	(II). 0
(C). a = -1, b = -1, c = 1	(III). -2
(D). a = -1, b = -1, c = -1	(IV). 4

(IV) ← (A)

(III) ← (B)

Choose the correct answer from the options given below:

A (A) - (IV), (B) - (I), (C) - (II), (D) - (III)

B (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

C (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

D (A) - (IV), (B) - (III), (C) - (II), (D) - (I)

$(-1) - 1 + 1 - 1$

$\Rightarrow -2$

Question – CUET 2025 PYQs

#Q. If $y = -4$ is a root of $\begin{vmatrix} y & 2 & 3 \\ 1 & y & 1 \\ 3 & 2 & y \end{vmatrix} = 0$, then the product of the other two roots is

A. -5

B. 4

C. 0

D. 3

$$y[y^2-2] - 2[y-3] + 3[2-3y] = 0$$

$$y^3 - 2y - 2y + 6 + 6 - 9y = 0$$

$$y^3 - 13y + 12 = 0$$

$\alpha = -4$, β, γ

$$\alpha\beta\gamma = -\frac{12}{1}$$

$$(-4)\beta\gamma = -12$$

$$\beta\gamma = 3$$

Question – CUET 2025 PYQs

#Q. If $x = -4$ is a root of $\begin{vmatrix} x & 2 & 3 \\ 1 & x & 1 \\ 3 & 2 & x \end{vmatrix} = 0$, then the sum of the other 2 roots is

A. 4

B. −3

C. 2

D. 5

$x^3 - 13x + 12 = 0$ $\begin{bmatrix} \alpha = -4 \\ \beta \\ \gamma \end{bmatrix}$

$\alpha + \beta + \gamma = \frac{-(\text{coeff of } x^2)}{(\text{coeff of } x^3)}$

$\alpha + \beta + \gamma = 0$

$-4 + \beta + \gamma = 0$

$\beta + \gamma = 4$

Question – CUET 2025 PYQs

#Q. The value of $\begin{vmatrix} x^2 - x + 1 & x - 1 \\ x + 1 & x + 1 \end{vmatrix}$ is equal to

A $x^3 + x^2 - 2$

B $x^3 + x^2 + 2$

C $x^3 - x^2 + 2$

D $x^3 - x^2 - 2$

$\Rightarrow (x+1)(x^2 - x + 1) - (x-1)(x+1)$

$(x^3 + 1^3) - (x^2 - 1^2)$

$x^3 - x^2 + 2$

Question – CUET 2025 PYQs

#Q. If $\begin{vmatrix} 1 & \cos\theta & 0 \\ \sin\theta & 1 & \cos\theta \\ \cos\theta & 1 & -\sin\theta \end{vmatrix} = A\sin\theta + B\cos\theta + C\sin\theta\cos\theta$ then:

$-\sin\theta + 0(\cos\theta) + 0(\sin\theta\cdot\cos\theta)$

$1\left[-\sin\theta - \cos\theta\right] - \cos\theta\left[-\sin^2\theta - \cos^2\theta\right]$

$\left(-\sin\theta - \cos\theta\right) + \cos\theta\left(\sin^2\theta + \cos^2\theta\right)$

$\sin^2\theta + \cos^2\theta = 1$

$-\sin\theta - \cos\theta + \cos\theta$

$= -\sin\theta$

$A = -1$

$B = 0$

$C = 0$

$B - A = 1$ ✓

- **A** $A + B = 0$
- **B** $B + C = 2$
- **C** $C + A = 1$
- **D** $B - A = 1$

Question – CUET 2025 PYQs

#Q. The value of $\begin{vmatrix} \log_5 10 & 2 \\ 2 & \log_{10} 5 \end{vmatrix}$ is

A. –3

B. –7/2

C. 1

D. 0

Question – CBSE 2025 PYQs

$$\begin{vmatrix} x+1 & x-1 \\ x^2+x+1 & x^2-x+1 \end{vmatrix}$$ is equal to:

$a^3+b^3 = (a+b)(a^2+b^2-ab)$

$a^3-b^3 = (a-b)(a^2+b^2+ab)$

$(x+1)(x^2-x+1) - (x-1)(x^2+x+1)$

$(x^3+1^3) - (x^3-1^3)$

$x^3+1-x^3+1 \Rightarrow 2$

A. $2x^3$

B. 2

C. 0

D. $2x^3-2$

QUESTION - CUET 2022 PYQs

C

Q. If $\begin{bmatrix} 1 & 2-x & 0 \\ x & 3 & 4 \\ x & 4 & x^2 \end{bmatrix} = Ax^4 + Bx^3 + Cx^2 + Dx + E$, then value of E is

Const Term

$1\left[3x^2 - 16\right] - (2-x)(x^3 - 4x)$

$-16 = E$

A 16

B -16

C 13

D 0

QUESTION - CUET 2023 PYQs

Let $A = \begin{bmatrix} 1 & \cos\theta & 1 \\ -\cos\theta & 1 & \cos\theta \\ -1 & -\cos\theta & 1 \end{bmatrix}$ $0 \le \theta \le 2\pi$, then :

A $|A| = 0$

B $|A| \in [2,4]$

C $|A| \in (2,4)$

D $|A| \in (2, \infty)$

$|A| \Rightarrow 1[1+\cos^2\theta] - \cos\theta[-\cos\theta + \cos\theta] + 1[\cos^2\theta + 1]$

$|A| \Rightarrow 2(1+\cos^2\theta)$

$1 \le |+\cos^2\theta \le 2$

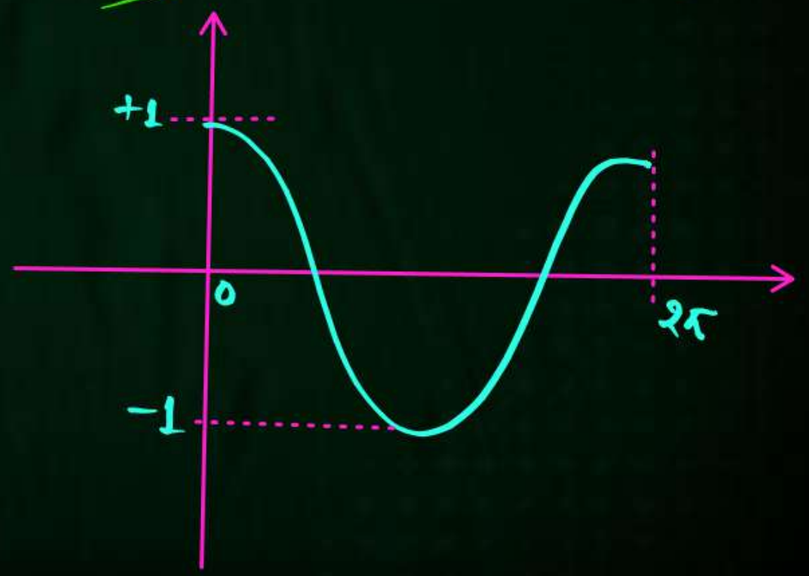
$0 \le \cos^2\theta \le 1$

$-1 \le \cos\theta \le 1$

$\theta \in [0, 2\pi]$

$2 \le 2(1+\cos^2\theta) \le 4$

$|A| \in [2,4]$



QUESTION - CUET 2022 PYQs

Q. Let $A = \begin{bmatrix} 1 & sinx & 1 \\ -sinx & 1 & sinx \\ -1 & -sinx & 1 \end{bmatrix}$, where $0 \leq x \leq 2\pi$, then

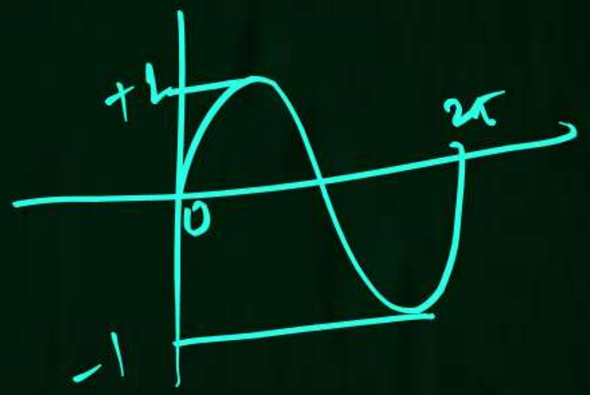
A $|A| = 0$

B $|A| = \in (2, \infty)$

C $|A| = \in (2, 4)$

D $|A| = \in [2, 4]$

$|A| = 2(1 + \sin\theta)$





Minor of an Element

- M_{ij} = Determinants formed by leaving the i^{th} row and j^{th} column

Exp: $\begin{bmatrix} 2 & -1 & 5 \\ 1 & 3 & 2 \\ 5 & 0 & 4 \end{bmatrix}$

$M_{11} = \begin{vmatrix} 3 & 2 \\ 0 & 4 \end{vmatrix} = 12$

$M_{12} = \begin{vmatrix} 1 & 2 \\ 5 & 4 \end{vmatrix} = 4 - 10 = -6$

$M_{13} = \begin{vmatrix} 1 & 3 \\ 5 & 0 \end{vmatrix} = -15$

$M_{21} = \begin{vmatrix} -1 & 5 \\ 0 & 4 \end{vmatrix} = -4$

$M_{22} = \begin{vmatrix} 2 & 5 \\ 5 & 4 \end{vmatrix} = 8 - 25 = -17$

$M_{23} = \begin{vmatrix} 2 & -1 \\ 5 & 0 \end{vmatrix} = +5$

$M_{31} = \begin{vmatrix} -1 & 5 \\ 3 & 2 \end{vmatrix} = -2 - 15 = -17$

$M_{32} = \begin{vmatrix} 2 & 5 \\ 1 & 2 \end{vmatrix} = 4 - 5 = -1$

$M_{33} = \begin{vmatrix} 2 & -1 \\ 1 & 3 \end{vmatrix}$

$\Rightarrow 6 + 1 = 7$

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Co - Factor of an Element

If M_{ij} represents the minor of the element belonging to i^{th} row and j^{th} column then the cofactor of that element is given by :

$$C_{ij} = (-1)^{i+j} M_{ij}$$

Exp: $\begin{bmatrix} 2 & -1 & 5 \\ 1 & 3 & 2 \\ 5 & 0 & 4 \end{bmatrix}$

$C_{11} = (-1)^2 \cdot M_{11} = M_{11} = 12$

$C_{12} = (-1)^3 \cdot M_{12} = -M_{12} = -(-6) = 6$

$C_{13} = (-1)^4 \cdot M_{13} = M_{13} = -15$

$C_{21} = (-1)^3 \cdot M_{21} = -M_{21} = (+4)$

$C_{22} = (-1)^4 \cdot M_{22} = M_{22} = -17$

$C_{23} = -M_{23} = -5$

$C_{31} = -17$

$C_{32} = 1$

$C_{33} = 7$

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Chalo Ek Jaadu Dikhata hu

$$\begin{bmatrix} 2 & -1 & 5 \\ 1 & 3 & 2 \\ 5 & 0 & 4 \end{bmatrix}$$

$C_{11} = 12$, $C_{12} = 6$, $C_{13} = -15$

$C_{21} = 4$, $C_{22} = -17$, $C_{23} = -5$

$C_{31} = -17$, $C_{32} = 1$, $C_{33} = 7$

$$\begin{bmatrix} 0 & 0 & 2 \\ 3 & 2 & 6 \\ 8 & 4 & 2 \end{bmatrix}$$

$a_{11}C_{11} + a_{12}C_{12} + a_{13}C_{13}$ (57, -81, 24)

$\therefore a_{11}C_{11} + a_{22}C_{22} + a_{33}C_{33} \neq \Delta$

$a_{11}\cdot c_{11} + a_{22}\cdot c_{22} + a_{33}\cdot c_{33} \Rightarrow (2)(12) + (-1)(6) + (5)(-15) = 24 - 6 - 75 \Rightarrow -57 = \Delta$

$a_{21}\cdot c_{21} + a_{22}\cdot c_{22} + a_{23}\cdot c_{23} = -57 = \Delta$

$a_{31}\cdot c_{31} + a_{32}\cdot c_{32} + a_{33}\cdot c_{33} = -57 = \Delta$

$a_{11}\cdot c_{11} + a_{21}\cdot c_{21} + a_{31}\cdot c_{31} = -57$

$a_{12}\cdot c_{12} + a_{22}\cdot c_{22} + a_{32}\cdot c_{32} = -57$

$a_{13}\cdot c_{13} + a_{23}\cdot c_{23} + a_{33}\cdot c_{33} = -57$

$a_{11}C_{21} + a_{12}C_{22} + a_{13}C_{23} = 0$

$a_{11}C_{31} + a_{12}C_{32} + a_{13}C_{33} = 0$

$$\begin{bmatrix} 3 & 2 & + \\ 6 & 2 & 0 \\ 4 & 8 & 0 \end{bmatrix}$$

$a_{13}C_{13} + a_{23}C_{23} + a_{33}C_{33}$

$1[48 - 8] = 40$



Properties of Co-factor

(i) The sum of the product of elements of any row (column) with their corresponding cofactors is always equal to the value of the determinant.

(ii) The sum of the product of elements of any row (column) with the cofactors of other row (column) is always equal to zero.

SSR SIR



IMP NOTES

1. We should open the determinants along any row or column consisting maximum number of Zero's

2. We can open the determinants along any row or column but not the diagonals.

$$a_{11}C_1 + a_{22}C_{22} + a_{33}C_{33} \neq \Delta$$

Question: CUET 2026 PYQs

If a_{ij} and A_{ij} represents the elements and cofactors of the matrix $A = \begin{bmatrix} 2 & 1 & 3 \\ 3 & 2 & 1 \\ 1 & 2 & 3 \end{bmatrix}$ then which of the following statements are True?

(A) $|A| = 28$

(B) $A_{23} = -3$

(C) $a_{11}A_{12} = -16$

(D) $\frac{A_{21}}{A_{13}} = \frac{3}{4}$

Choose the correct answer from the options given below:

A (A), (C) and (D) only

B (B), (C) and (D) only

C (C) and (D) only

D (B) and (C) only

$A_{23} \Rightarrow -[4-1] = -3$

$A_{13} = 6-2 = 4$

$A_{21} = -[3-6] \Rightarrow 3$

Question: CUET 2026 PYQs

For a matrix $A = \begin{bmatrix} a & -1 & b \\ -2 & 1 & -1 \\ 1 & 0 & 2 \end{bmatrix}$, $C_{32} = -1$ and $C_{33} = 3$, where C_{ij} is the cofactor of element a_{ij} in A. Then

$(-1)^{i+j}$

$\begin{vmatrix} + & - & + \\ - & + & - \\ + & - & + \end{vmatrix}$ 3*3

(A) $a = 5$ & $b = 2$

(B) $a = 5$ & $b = 3$

(C) $a = 2$ & $b = 5$

(D) $a = 3$ & $b = 5$

Question: CUET 2026 PYQs

If matrix $A = \begin{bmatrix} 12 & 7 & 9 \\ 6 & 3 & 2 \\ 5 & 1 & 8 \end{bmatrix}$, then

Match the LIST-I with LIST-II.

LIST-I	LIST-II
A. $\|A\|$	I. 38
B. Cofactor of a_{31}	II. -23
C. Minor of a_{23}	III. -83
D. Cofactor of a_{12}	IV. -13

Choose the correct answer from the options given below:

A. A-IV, B-II, C-I, D-III

B. A-IV, B-III, C-II, D-I

C. A-III, B-IV, C-II, D-I

D. A-III, B-II, C-I, D-IV

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{bmatrix}$, then which of the following statements are TRUE ?

[where A_{ij} is the cofactor of the $(i,j)^{th}$ element, a_{ij} of matrix A, $1 \geq i,j \leq 3$.]

(A) $a_{11}\,A_{31} = -24$

(B) $a_{12}\,A_{32} = -66$

(C) $a_{13}\,A_{33} = -90$

(D) $a_{21}\,A_{21} = -24$

Choose the correct answer from the options given below:

A (B) and (C) only

B (C) and (D) only

C (A) and (C) only

D (A) and (B) only

Question – CBSE 2024 PYQs

If $A = [a_{ij}] = \begin{bmatrix} 2 & -1 & 5 \\ 1 & 3 & 2 \\ 5 & 0 & 4 \end{bmatrix}$ and c_{ij} is the cofactor of element a_{ij}, then the value of $a_{21} \cdot c_{11} + a_{22} \cdot c_{12} + a_{23} \cdot c_{13}$ is:

A. -57

B. 0

C. 9

D. 57

SSR SIR

Question – CUET 2025 PYQs

#Q. Let $A = \begin{bmatrix} 152 & 105 & 3 \\ 149 & 25 & 35 \\ 2 & 1 & 0 \end{bmatrix}$. If A_{ij} denotes the co-factor of an element a_{ij} of the matrix A, then the value of $a_{11}A_{21} + a_{12}A_{22} + a_{13}A_{23}$ is equal to

$= 0$

A. -1

B. 0

C. 1

D. 1529



Properties of the Determinant

1 We can interchange row's and column's of a determinant

$$\Delta = \begin{vmatrix} a & b & c \\ 1 & 2 & 3 \\ p & q & r \end{vmatrix} \longleftrightarrow \begin{vmatrix} a & 1 & p \\ b & 2 & q \\ c & 3 & r \end{vmatrix}$$

$|A|$ $\qquad$ $|A^T|$

$$\Delta = \begin{vmatrix} a & 1 & p \\ b & 2 & q \\ c & 3 & r \end{vmatrix}$$

① $|A| = |A^T|$

SSR SIR

2

$$\begin{vmatrix} a & b & c \\ 1 & 2 & 3 \\ p & q & r \end{vmatrix} = \Delta$$

1 Interchange → (−) Aayega.

$R_1 \leftarrow R_2$

$$\begin{vmatrix} 1 & 2 & 3 \\ a & b & c \\ p & q & r \end{vmatrix} = -\Delta$$

$R_2 \leftarrow R_3$

$$\begin{vmatrix} 1 & 2 & 3 \\ p & q & r \\ a & b & c \end{vmatrix} = -(-\Delta) = +\Delta$$

→If we interchange **ODD Number** of times, value of determinants will be ***negative times***.

→If we interchange **EVEN Number** of times, value of determinants will be ***Same***.

SSR SIR

3

$$\begin{vmatrix} 0 & 0 & 0 \\ a & b & c \\ p & q & r \end{vmatrix} = 0$$

$$q_{11}C_{11} + q_{12}C_{12} + q_{13}C_{13} = 0$$

$$\begin{vmatrix} 0 & a & p \\ 0 & b & q \\ 0 & c & r \end{vmatrix} = 0$$

→If any row/column of a determinant is **ZERO**, value of determinant will be ***ZERO***

SSR SIR

4

$$\begin{vmatrix} a & b & c \\ a & b & c \\ p & q & r \end{vmatrix} = 0$$

$$\begin{vmatrix} a & b & c \\ a & b & c \\ p & q & R \end{vmatrix} = \Delta$$

$R_1 \leftrightarrow R_2$

$$\begin{vmatrix} a & a & p \\ b & b & q \\ c & c & r \end{vmatrix} = 0$$

$$\begin{vmatrix} a & b & c \\ a & b & c \\ p & q & R \end{vmatrix} = -\Delta$$

$\Delta = -\Delta$

$2\Delta = 0$

$\Delta = 0$

→If any two Row/Column of a determinant is ***same***, value of Determinant will be ***Zero***

SSR SIR

5

$$\Delta = \begin{vmatrix} a & b & c \\ 1 & 2 & 3 \\ p & q & r \end{vmatrix}$$

$$\lambda\Delta = \begin{vmatrix} \lambda a & \lambda b & \lambda c \\ 1 & 2 & 3 \\ p & q & R \end{vmatrix}$$

$$\Rightarrow \begin{vmatrix} a & b & c \\ 1 & 2 & 3 \\ \lambda p & \lambda q & \lambda R \end{vmatrix}$$

→If we multiply **any constant** in determinant, it will be multiplied ***in a single Row/Column only***

SSR SIR

6

$$\Delta = \begin{vmatrix} 2 & 4 & 6 \\ 6 & 8 & 10 \\ 12 & 14 & 16 \end{vmatrix}$$

$2(x+y) = 2x+2y$

$2x+2y = 2[x+y]$

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

$$\lambda A = \begin{bmatrix} \lambda & 2\lambda \\ 3\lambda & 4\lambda \end{bmatrix}$$

$$\Delta = 2 \begin{vmatrix} 2 & 4 & 3 \\ 6 & 8 & 5 \\ 12 & 14 & 8 \end{vmatrix}$$

$$\Rightarrow 2 \cdot 2 \begin{vmatrix} 2 & 4 & 3 \\ 6 & 8 & 5 \\ 6 & 7 & 4 \end{vmatrix}$$

→If we take common from a determinant, it will be from ***a single Row/Column only***

SSR SIR

7 →Addition of two Determinants

$$\begin{vmatrix} a+p & l & x \\ b+q & m & y \\ c+r & n & z \end{vmatrix} = \begin{vmatrix} a & l & x \\ b & m & y \\ c & n & z \end{vmatrix} + \begin{vmatrix} p & l & x \\ q & m & y \\ r & n & z \end{vmatrix}$$

Question: CUET 2026 PYQs

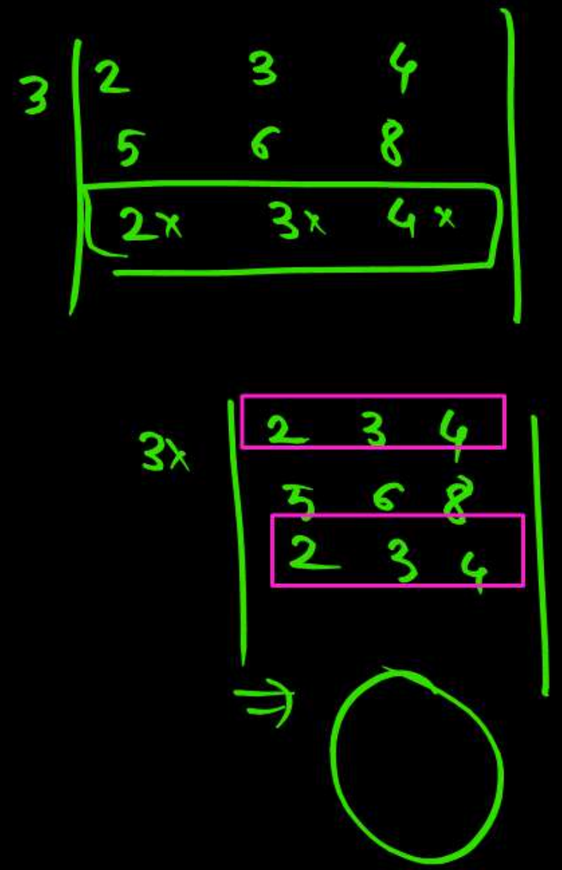
The value of $\begin{vmatrix} 2 & 3 & 4 \\ 5 & 6 & 8 \\ 6x & 9x & 12x \end{vmatrix}$ is

A. 6x

B. 135x

C. 4x+8

D. 0



Question: CUET 2026 PYQs

2025

The value of $\begin{vmatrix} 9! & 10! & 11! \\ 10! & 11! & 12! \\ 11! & 12! & 13! \end{vmatrix}$ is

$1\cdot2\cdot3\cdots9\cdot10\cdot1$

$1\cdot2\cdot3\cdots9\cdot10$

$(9!)\cdot10$

$\Rightarrow \begin{vmatrix} 9! & (9!)10 & (9!)10\cdot11 \\ 10! & (10!)11 & (10!)*11*12 \\ 11! & (11!)\cdot12 & (11!)(12)(13) \end{vmatrix}$

$\Rightarrow (9!)(10!)(11!)\begin{vmatrix} 1 & 10 & 10\cdot11 \\ 1 & 11 & (11)(12) \\ 1 & 12 & 12\cdot13 \end{vmatrix}$

→ Elementary Transformation

(A) $9!.10!.11!$

(B) $2(9!.10!.11!)$

(C) $3(9!.10!.11!)$

(D) $4(9!.10!.11!)$

$4! = 4*3*2*1$

$5! = 5*(4*3*2*1)$

$6! = 6*(5*4*3*2*1) = (6)5!$

$7! = 7*(\quad\quad*1) = 7(6!)$

$5! = (4!)5$

$n! = (n-1)!\cdot n$

Question – CUET 2025 PYQs

#Q. Which of the following statements is incorrect?

A. If two rows or two columns of a determinant are identical, then the value of the determinant is zero

B. If all the elements in any one row of the determinant are zero, then the determinant value is zero

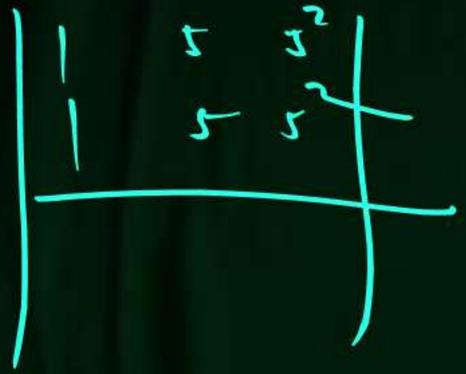
C. The value of the determinant remains unchanged if its rows and columns are interchanged. $|A| = |A^T|$

D. If any two rows of a determinant are interchanged, then the sign of the determinant remains unchanged. X

QUESTION - CUET 2023 PYQs

The value of $\begin{vmatrix} 5^2 & 5^3 & 5^4 \\ 5^3 & 5^4 & 5^5 \\ 5^4 & 5^5 & 5^6 \end{vmatrix}$ is:

$5^2 \cdot 5^3 \cdot 5^4$



A 5^2

B 0

C 5^{13}

D 5^9

QUESTION - CUET 2023 PYQs

Value of $\begin{vmatrix} \frac{1}{a} & a^2 & bc \\ \frac{1}{b} & b^2 & ac \\ \frac{1}{c} & c^2 & ab \end{vmatrix}$ is

A 0

B 1

C -1

D None of these

SSR SIR



Some IMP Properties of the Determinant

1. $|A \pm B| \neq |A| \pm |B|$

2. $|A.B| = |A|\,|B|$
$|ABC| = |A||B||C|$

3. $|A_1 \cdot A_2 \cdots A_n| = |A_1| \cdot |A_2| \cdots |A_n|$

$A_1 = A_2 = \cdots A_n = A$

$|\underbrace{A \cdot A \cdots A}_{n \text{ times}}| = \underbrace{|A| \cdot |A| \cdots |A|}_{n \text{ times}}$

$$|A^n| = |A|^n$$

4. $|A^T| = |A|$

5. $|I| = I$

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix} = 1$$

6. **Determinants of Diagonal Matrix**

$$\begin{vmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{vmatrix} = abc$$

Determinants of |KA|

Let we have A is a square matrix of Order n, then

$$A = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \quad - |A| = (ad - bc)$$

$$kA = \begin{bmatrix} ka & kb \\ kc & kd \end{bmatrix} \rightarrow |kA| = (ka)(kd) - (kb)(kc)$$

$$\frac{2*2}{3*3} \qquad |kA| = k^2[ad - bc]$$

$k^3|A|$

$n*n$ $k^n|A|$ $4*4$ $k^4|A|$

$$|kA| = k^{(2)}|A|$$

For any square matrix A having order n, $|KA| = K^n|A|$

Sqr Matrix — n

$$|(\text{const}) \cdot \text{Matrix}| = (\text{const})^n |\text{Matrix}|$$

$$|kA| = k^n|A|$$

#

$$|A \cdot B| = |A| \cdot |B|$$

$$|A^T| = |A|$$

$$|kA| = k^n |A|$$

$$|A^n| = |A|^n$$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} k & 2 \\ 2 & k \end{bmatrix}$ and $|A^3| = 125$, then the value of k is

A ± 3

B ± 5

C 2

D -2

$|A|^3 = 125$

$|A| = 5$

$k^2 - 4 = 5$

$k^2 = 9$

$k = \pm 3$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} -6 & 4 \\ -8 & 5 \end{bmatrix}$, then $|A^5| =$ _____.

$|A|^5 = 2^5 \Rightarrow 32$

$|A| = -30 + 32 \Rightarrow 2$

A. 625

B. 256

C. 25

D. 32

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} \cos\ \alpha & \sin\ \alpha \\ -\sin\ \alpha & \cos\ \alpha \end{bmatrix}$, then the value of $1000|A^n| + 2|A|$ for a positive integer n, is equal to

$|A| = \cos^2\alpha + \sin^2\alpha$

$|A| = 1$

$\Rightarrow (1000)|A|^n + 2*1$

$\Rightarrow (1000) + 2$

$\Rightarrow 1002$

(A) $1000n + 2$

(B) $2008n + 2$

(C) 2002

(D) 1002

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{bmatrix}$, then the value of ~~$1000|A^n| + 2|A|$~~ for a positive integer n, is equal to

$|1000[|A_1| + |A_2| + |A_3| + \cdots |A_n|] + 2|A|$

$|A| = 1$

$|1000[\underbrace{|1|+|1|+|1|+\cdots+|1|}_{n \text{ times}}] + 2 \cdot 1$

(A) $1000n + 2$

(B) $2008n + 2$

(C) 2002

(D) 1002

$\Rightarrow 1000n + 2$ ✓

Ans

CUET2027

$1^n \Rightarrow \underbrace{1 \cdot 1 \cdot 1 \cdot 1 \cdot 1 \cdots 1}_{} \Rightarrow 1$

$1+1 = 2$

$1+1+1 = 3$

$\underbrace{1+1+1+1+\cdots+1}_{n \text{ times}} = n$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} \alpha & \beta \\ \gamma & \Delta \end{bmatrix}$, such that $|A| = 25$, then the value of $\left|\frac{1}{5}A\right|$ is.

2*2

(A) 1

(B) $\frac{1}{5}$

(C) 5

(D) 125

$\Rightarrow \left(\frac{1}{5}\right)^2 \cdot |A|$

$\Rightarrow \left(\frac{1}{25}\right)(25)$

$\Rightarrow 1$

Question: CUET 2026 PYQs

If A is a square matrix of order 3 and $|A| = 6$, then the value of $|2A^T|$ is:

$2^3 |A^T|$

$\Rightarrow 8 * 6$

$\Rightarrow 48$

A. 40

B. 48

C. 12

D. 24

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 1 & a \\ b & 2 \end{bmatrix}$ and $B = \begin{bmatrix} a & 1 \\ 2 & -3b \end{bmatrix}$ such that $|AB| = |2B|$ and $ab \neq -\frac{2}{3}$ then:

A. $|A| = 2$
B. $|A| = 4$
C. $|B| = 2$
D. $|B| = 4$

Choose the correct answer from the options given below:

$|A| = 2 - ab = 4$

$|B| = (-3ab - 2) = -3(-2) - 2$

$\Rightarrow 6 - 2$

$\Rightarrow 4$

$|A||B| = 4|B|$

$|A| = 4$

$2 - ab = 4$

$ab = -2$

(A) A and C only

(B) B and D only

(C) A and D only

(D) B and C only

Question: CUET 2026 PYQs

A and B are square matrices of order 3 each such that $|A| = 3, |B| = 2$, then the value of $|4AB|$ will be?

- (A) 249
- (B) 960
- (C) 384 ✓
- (D) 348

$$|4AB| = 4^3 |A \cdot B|$$

$$\Rightarrow 64 \cdot |A||B|$$

$$\Rightarrow (64)(3)(2)$$

$$= 384$$

Question: CUET 2026 PYQs

If A is a 3×3 matrix with $|A| = 4$, then $|4A|$ is equal to:

$4^3|A|$

$\Rightarrow 64 \times 4$

A. 16

B. 256

C. 64

D. 12

Question – CUET 2025 PYQs

#Q. If matrix $A_P = \begin{bmatrix} p & (p+1) \\ p & (p-1) \end{bmatrix}, p \in N$ (where N is the set of natural number), then value of $|A_1| + |A_2| + |A_3| + \ldots + |A_{2025}|$ is

A. $-(2025)(2026)$

B. $(2025)^2$

C. $(2025)(2026)$

D. $-(2025)^2$

$|A_p| = p(p-1) - p(p+1)$

$|A_p| = p^2 - p - p^2 - p$

$|A_p| = -2p$

$|A_p| = (-2) \cdot p$

$-2[1+2+3+\ldots+2025]$

$\Rightarrow -\frac{2[2025][2026]}{2}$

$\Rightarrow -(2025)(2026)$

#

$$\underbrace{1+2+3+\cdots+n}_{\text{Sum of all Natural No}} = \frac{n(n+1)}{2}$$

Question – CUET 2025 PYQs

#Q. If $A = \begin{bmatrix} 0 & 1 & -3 \\ -1 & 0 & 5 \\ 3 & -5 & 0 \end{bmatrix}$, then the value of $|A^{2025}|$ is

$|A| = 0[\ ] - 1[-15] - 3[5]$

$\Rightarrow 15 - 15$

$\Rightarrow 0$

$\Rightarrow |A|^{2025}$

$\Rightarrow$

A. 1

B. 126

C. –126

D. 0

Question – CUET 2025 PYQs

#Q. If matrix $A = \begin{bmatrix} p & -3 \\ -4 & p \end{bmatrix}$ and $|A^3| = 64$, then the value of p is:

$p^2 - 12 = 4$

$p^2 = 16$

$p = \pm 4$

$|A|^3 = 64$

$|A| = 4$

A ±1

B ±2

C ±3

D ±4 ✓

Question – CUET 2025 PYQs

#Q. If A is a square matrix of order 3 and $|A| = 5$, then the value of $|-AA^T|$ is

$n = 3$

$(-1)^3 |A| \cdot |A^T|$

$-(5)(5)$

A. 25

B. -25

C. 5

D. -5

Question – CUET 2025 PYQs

#Q. Let $A = [a_{ij}]_{2\times4}$ and $B = [b_{ij}]_{4\times2}$, then $|3AB|$ is equal to

- A $3^2|AB|$
- B $3^4|AB|$
- C $3^2|A|\,|B|$
- D $3^4|A|\,|B|$

$|A|$ – Not Defined
$|B|$ ✗

$AB = [A]_{2*4}\,[B]_{4*2}$

$[AB]_{2*2}$

$|3AB| = 3^2|AB|$

$3^2|A|\cdot|B|$

Question – CUET 2025 PYQs

#Q. If A and B square matrices of order 3 such that $|A| = -1$, $|B| = 5$, then the value of $[2AB|$ is:

A. -40

B. -10

C. 20

D. -20

$$|2AB| = 2^3 |A| \cdot |B| \Rightarrow 8(-1)(5)$$

$$\Rightarrow -40$$

Question – CUET 2025 PYQs

#Q. Let $A = [a_{ij}]_{2\times3}$ and $B = [b_{ij}]_{3\times2}$, then $|5AB|$ is equal to

Already Done

A $5^2 \cdot |A| \cdot |B|$

B $5^3 \cdot |A| \cdot |B|$

C $5^2 |AB|$

D $5^3 |AB|$



Singular & Non – Singular Matrix

SINGULAR MATRIX

For a square matrix if $|A| = 0$ ⇔ Singular matrix

NON SINGULAR MATRIX

For a square matrix if $|A| \neq 0$ ⇔ Non Singular matrix



IMP Property – Skew Symmetric Matrix

→Let A is a skew – symmetric Matrix *Then*

$A^T = -A$

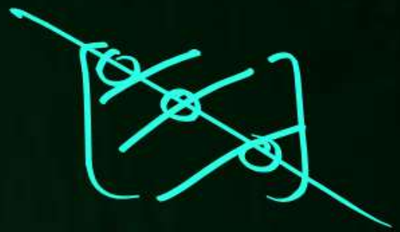
Taking det both side

$|A^T| = |-A|$

$$|A| = (-1)^n |A|$$

(I) If n is EVEN $\Rightarrow (-1)^n = +1$

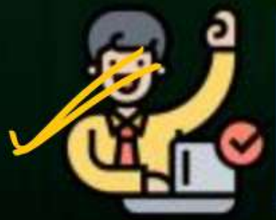
$|A| = |A|$ [Always True]



(II) If n is ODD $\Rightarrow (-1)^n = -1$

$|A| = -|A|$

$2|A| = 0 \Rightarrow \boxed{|A| = 0}$



Determinants of ODD Order of Skew – Symmetric Matrix is equal to ZERO

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 2 & 1 & -1 \\ 0 & 3 & -2 \\ k & 1 & 0 \end{bmatrix}$ is non-singular matrix, then the value (s) of k belongs to:

[Where R is the set of real numbers]

$|A| \neq 0$

(A) $R - \{0\}$

(B) $R - \{4\}$

(C) $R - \{-4\}$

(D) R

$2[0+2] - 1[0+2k] - 1[0-3k] \neq 0$

$4 - 2k + 3k \neq 0$

$k \neq -4$

$k \in R - \{-4\}$

Question: CUET 2026 PYQs

If a matrix $A = \begin{bmatrix} x+3 & 3 \\ 2x+1 & 5 \end{bmatrix}$ is singular, then the value of x will be

$\begin{vmatrix} x+3 & 3 \\ 2x+1 & 5 \end{vmatrix} = 0$

$5x + 15 - 6x - 3 = 0$

$-x + 12 = 0$

$x = 12$

(A) $x = -12$

(B) $x = -10$

(C) $x = 12$ ✓

(D) $x = 10$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} a & 1 & c \\ b & 2 & 1 \\ 2 & 1 & c \end{bmatrix}$ is a singular matrix, then

$|A| = 0$

$a[2c-1] - 1[bc-2] + c[b-4] = 0$

$2ac - a - bc + 2 + bc - 4c = 0$

$2ac - a - 4c + 2 = 0$

(A) $a = 2c, b \in R$ (Set of real numbers)

(B) $a = 2, c = \frac{1}{2}, b \in R$ (Set of real numbers)

(C) $b = 4c, a \in R$ (Set of real numbers)

(D) $b = 2a, c \in R$ (Set of real numbers)

(B) $(2)(\frac{1}{2}) - 2 - b(\frac{1}{2}) + 2$

$1 - 1 - \frac{b}{2} + 2 = 0$

$2ac - a - 4c + 2 = 0$

$b \in R$

Question: CUET 2026 PYQs

For what value of μ, $\begin{bmatrix} 5 & \mu - 7 \\ 12 & 9 \end{bmatrix}$ is a singular matrix?

A +1.75

B 10.75

C -10.75

D 17.5

$45 - 12(\mu - 7) = 0$

$12\mu - 84 = 45$

$12\mu = 129$

$\mu = 10.75$

Question – CUET 2025 PYQs

#Q. If $\begin{bmatrix} x-y & 0 \\ x+y & 1 \end{bmatrix}$ is an identity matrix and $\begin{bmatrix} x & y \\ z & x \end{bmatrix}$ is a singular matrix then:

$= \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

$x - y = 1$

$x + y = 0$

$2x = 1$

$x = \frac{1}{2}$

$y = -\frac{1}{2}$

$\begin{vmatrix} x & y \\ z & x \end{vmatrix} = 0$

$x^2 - yz = 0$

$\left(\frac{1}{2}\right)^2 - \left(-\frac{1}{2}\right) \cdot z = 0$

$z = -\frac{1}{2}$

$x > y = z$

A. $x > y = z$

B. $x = y > z$

C. $x = y < z$

D. $x \neq y \neq z$

Question – CBSE 2025 PYQs [MCQS]

If $\begin{bmatrix} 4+x & x-1 \\ -2 & 3 \end{bmatrix}$ is a singular matrix, then the value of x is :



A 0

B 1

C -2

D -4

Question – CUET 2025 PYQs

#Q. If $\begin{bmatrix} -1 & 1 & 0 \\ a & b & 1 \\ 1 & 2 & 1 \end{bmatrix}$ is a singular matrix, then the relation between a and b is:

$-1[b-2]-1[a-1]=0$

$-b+2-a+1=0$

$-a-b+3=0$

$a+b=3$

A $2a = b$

B $a + b = 0$

C $a + b = 3$

D $a + b = ab$

QUESTION - NCERT

The value of $\begin{vmatrix} 0 & a-b & a-c \\ b-a & 0 & b-c \\ c-a & c-b & 0 \end{vmatrix}$ is-

(A) 0

(B) abc

(C) (a-b) (b-c) (c-a)

(D) None of these

Question 10

The value of $|A|$, if $A = \begin{bmatrix} 0 & 2x-1 & \sqrt{x} \\ 1-2x & 0 & 2\sqrt{x} \\ -\sqrt{x} & -2\sqrt{x} & 0 \end{bmatrix}$, where $x \in \mathbb{R}^+$, is

3*3

A $(2x+1)^2$

B 0

C $(2x+1)^3$

D $(2x-1)^2$

Question – CBSE 2025 PYQs [MCQS]

Let P be a skew-symmetric matrix of order 3. If $\det(P) = \alpha$, then $(2025)^{\alpha}$ is

A. 0

B. 1

C. 2025

D. $(2025)^3$

QUESTION: CBSE 2022 PYQs

Q. If $0 < x < \pi$ and the matrix $\begin{bmatrix} 4\sin x & -1 \\ -3 & \sin x \end{bmatrix}$ is singular, then the values of x are:

(1) $\pi/3, 2\pi/3$

(2) $\pi/6, 5\pi/6$

(3) $\pi/6, \pi/3$

(4) $\pi/6, 2\pi/3$

$4\sin^2 x - 3 = 0$

$\sin^2 x = 3/4$

$\sin x = \pm \sqrt{3}/2$

$x = \pi/3$

$x = \pi - \pi/3 \Rightarrow 2\pi/3$

C

A 1

B 3

C 2

D 4



Adjoint of a Matrix

If A = $[a_{ij}]$ is a square matrix of order n and C_{ij} denote the cofactor of a_{ij} in A, then the transpose of the matrix of cofactors of elements of A is called the adjoint of A and is denoted by adj A.

i.e., adj A = $[C_{ij}]^T$

If $A = \begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$, then

$C_{ij} = \begin{bmatrix} C_{11} & C_{12} & C_{13} \\ C_{21} & C_{22} & C_{23} \\ C_{31} & C_{32} & C_{33} \end{bmatrix}$

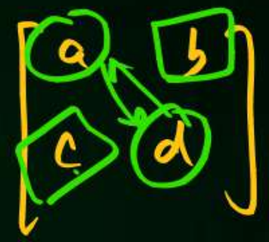
Adj A = $[C_{ij}]^T$

adj A = $\begin{vmatrix} C_{11} & a_{21} & a_{31} \\ C_{12} & C_{22} & a_{32} \\ C_{13} & a_{23} & a_{33} \end{vmatrix}$

Adjoint of 2*2 Matrix

Let we have A is a square matrix of Order n, then

The adjoint of a square matrix of order 2 can be obtained by interchanging the diagonal elements and changing the signs of off-diagonal elements.



$C_{11} = d$ | $C_{12} = -b$

$C_{21} = -c$ | $C_{22} = a$

If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, **then**

$\text{Adj } A = [C_{ij}]^T$

$C_{ij} = \begin{bmatrix} C_{11} & C_{12} \\ C_{21} & C_{22} \end{bmatrix}$

$C_{ij} = \begin{bmatrix} d & -c \\ -b & a \end{bmatrix}$

$$\text{adj } A = \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}.$$

$\text{Adj } A = \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$

Q. The adjoint of matrix $A = [a_{ij}] = \begin{bmatrix} p & q \\ r & s \end{bmatrix}$ is

(a) $\begin{bmatrix} s & -q \\ -r & p \end{bmatrix}$

(b) $\begin{bmatrix} s & q \\ r & -p \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 0 \\ 0 & q \end{bmatrix}$

(d) None of these

adj $A = \begin{bmatrix} s & -q \\ -r & p \end{bmatrix}$

Properties of the Adjoint of a Matrix

If A and B are square matrices of the same order n, then

(I) $\text{Adj}(A \pm B) \neq (\text{Adj}\,A) + (\text{Adj}\,B)$

(II) $\text{Adj}(A \cdot B) = (\text{Adj}\,B) \cdot (\text{Adj}\,A)$

$\neq (\text{Adj}\,A)(\text{Adj}\,B)$

(III) $\text{Adj}(I_n) = I_n$

(IV)

$A \cdot (\text{Adj}\,A) = (\text{Adj}\,A) \cdot A = |A| \cdot I_n$

(#)

$$\begin{vmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{vmatrix}$$

$$\text{Adj}\,A = \begin{bmatrix} bc & 0 & 0 \\ 0 & ac & 0 \\ 0 & 0 & ab \end{bmatrix}$$

(v) $$\left|\underbrace{Adj(Adj(Adj\cdots AdjA)}_{r \text{ times}}\right| = |A|^{(n-1)^r}$$

r = No. of times Adj have been written

n = Order of the Square Matrix

for $r=1$ $$|AdjA| = |A|^{(n-1)}$$ ($r=1$)

for $r=2$ $$|Adj(AdjA)| = |A|^{(n-1)^2}$$

Question: CUET 2026 PYQs

If A and B are square matrices of order 3×3 such that $|A| = 7$ and $|B| = 6$, then $|B \text{ adj } A| =$

A. 42

B. 942

C. 284

D. 294

$|B| \cdot |\text{Adj}A|$

$|B| \cdot |A|^2$

$6 * 49$

$\Rightarrow 294$.

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$, then $|\text{adj}(\text{adj } A)|$ is:

$|\text{adj}(\text{adj } A)|$

$n = 2$

$|A| = [1-4] - 2[2-4] + 2[4-2]$

$\Rightarrow -3 + 4 + 4$

$\Rightarrow 5$

$|A|^{(n-1)^2}$

$\Rightarrow |A|^{(2)^2}$

$\Rightarrow |A|^4 = 5^4 = 625$

(A) 25

(B) 125

(C) 625 ✓

(D) 5

Question: CUET 2026 PYQs

If A is a square matrix of order 3 and $|\text{adj } A| = 3$, then $|A|$ is equal to:

(A) $\sqrt{3}$

(B) $-\sqrt{3}$

(C) 9

(D) -9

Choose the correct answer from the options given below:

$|A|^2 = 3$

$|A| = \pm\sqrt{3}$.

A (A) and (B) only

B (C) and (D) only

C (A) only

D (C) only

Question: CUET 2026 PYQs

Let A be a square matrix of order 3 such that $|A| = 3$, then the value of $\frac{|\text{adj}(\text{adj } A)|}{|A|}$ is

(A) 27

(B) 81

(C) 3

(D) 9

$n=2$

$\Rightarrow \frac{|A|^{2^2}}{|A|}$

$\Rightarrow \frac{|A|^4}{|A|}$

$\Rightarrow |A|^3 \Rightarrow 3^3 \Rightarrow 27$

Question: CUET 2026 PYQs

Let A, B be square matrices of order 3×3. Then $|A \cdot \text{adj}(A) \cdot B|$ is

(A) $|A|^2 \cdot |B|$

(B) $|A|^3 \cdot |B|$

(C) $|A|^2 \cdot |B|^2$

(D) $|A| \cdot |B|^3$

$\Rightarrow |A| \cdot |\text{Adj}\, A| \cdot |B|$

$\Rightarrow |A| \cdot |A|^2 \cdot |B|$

$\Rightarrow |A|^3 \cdot |B|$

Question: CUET 2026 PYQs

If A is a diagonal matrix of order 3 with diagonal elements as 2, 3, 4, then $|\text{adj } A|$ is

A. 24

B. 288

C. 576

D. 13824

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 4 \end{bmatrix}$$

$$|A| = 24$$

$$\text{Adj}A = \begin{bmatrix} 12 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 6 \end{bmatrix}$$

$$\Rightarrow |A|^2$$

$$\Rightarrow 24^2$$

$$\Rightarrow 576$$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 3 & -2 & 3 \\ 2 & 1 & -1 \\ 4 & -3 & 2 \end{bmatrix}$ and $A(\text{adj } A) = xI$, where I is an identity matrix of order 3, then x is equal to

$A \cdot (A \text{adj} A) = |A| \cdot I_n$

$X = |A| \Rightarrow 3[2-3] + 2[4+4] + 3[-6-4]$

$-3 + 16 - 30$

$\Rightarrow -17$

A. -17

B. 17

C. 7

D. 1

Question: CUET 2026 PYQs

If A is a square matrix of order 4 and $|\text{adj } A| = 8$, then $|A| =$

A. $5/2$

B. $2\sqrt{2}$

C. 2 ✓

D. 64

$$|A|^{(n-1)} = 8$$

$$|A|^{(4-1)} = 8$$

$$|A|^3 = 8 \quad \text{——} \quad |A| = 2$$

Question: CUET 2026 PYQs

If A is a square matrix of order 3 such that $|A| = 3$, then the value of $|\text{adj } A| + |\text{adj}(\text{adj } A)|$ is

(A) 108

(B) 90

(C) 26

(D) 74

$\Rightarrow |A|^2 + |A|^{(2)^2}$

$\Rightarrow |A|^2 + |A|^4$

$\Rightarrow 3^2 + 3^4$

$\Rightarrow 3^2(1+3^2) \Rightarrow 9*10$

$\Rightarrow 90$

Question: CUET 2026 PYQs

For a square matrix A of order 3, if $|A| = -3$, then $|4 \text{ adj } A|$ is equal to

$n = 3$

$4^3 |\text{Adj } A|$

$\Rightarrow (64)|A|^2$

$\Rightarrow (64)(-3)^2$

$\Rightarrow 64 * 9 \Rightarrow 576$

A. 576 ✓

B. 128

C. 64

D. -48

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} x+4 & 3 \\ 2 & 1 \end{bmatrix}$, $B = \begin{bmatrix} 5 & 2x-1 \\ 2 & x \end{bmatrix}$ and $|adj(AB)| = 32$, then the value of x is:

2*2 2*2

$|A| = x+4-6$

$|A| \Rightarrow (x-2)$

$|B| = 5x - 4x + 2$

$\Rightarrow (x+2)$

$|(A_{3\times3}B)\cdot(A_{3\times3}A)| = 32$

$|A_{3\times3}B| \cdot |A_{3\times3}A| = 32$

$|B| \cdot |A| = 32$

$(x-2)(x+2) = 32$

$x^2 - 4 = 32$

$x^2 = 36$

$x = \pm 6$

A ± 3

B ± 4

C ± 6

D ± 2

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} \lambda & 0 & 0 \\ 0 & \lambda & 0 \\ 0 & 0 & \lambda \end{bmatrix}$, $\lambda \neq 0$, then $|adj\ A|$ is equal to

$|A| = \lambda^3$

$\Rightarrow |A|^2 \Rightarrow (\lambda^3)^2 \Rightarrow \lambda^6$

(A) λ^{27}

(B) λ^3

(C) λ^9

(D) λ^6 ✓

Question: CUET 2026 PYQs

Let A be a square matrix of order 3 and $|A| = -3$, then $|adj(3A)|$ is equal to:

A. 3^8

B. -3^8

C. 3^6

D. -3^6

$$|3A|^2$$

$$\Rightarrow [3^3|A|]^2 \Rightarrow 3^6 \cdot |A|^2$$

$$\Rightarrow 3^6 \cdot (-3)^2$$

$$\Rightarrow 3^8$$

Question: CUET 2026 PYQs

If A is a matrix of order 3×3 such that $|A| = 4$ and $|k.adj\ A| = 32|A|$, $k \in R$; then the value of k is:

A) 1

B) 2

C) 4

D) 8

$k^3|Adj\ A| = 32|A|$

$k^3|A|^2 = 32|A|$

$k^3(4) = 32$

$k^3 = 8$ — $k = 2$

Question: CUET 2026 PYQs

If A is a square matrix of order 3 with $|A| = 4$, then the value of $|2\ adj\ A|$ is:

A. 128

B. 256

C. 512

D. 64

$2^3 |A|^2$

$\Rightarrow 8 * 16$

Question: CUET 2026 PYQs

For any 3×3 matrix A, if $A(adj\ A) = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$, then $2|A|$ is equal to

A. 5

B. 10

C. 25

D. 100

$A \cdot (Adj A) = 5 \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$A(Adj A) = 5 \cdot I = |A| \cdot I$

$|A| = 5$

$2(5) = 10$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 3 & 5 \\ a & b \end{bmatrix}$ and $adj\ A = \begin{bmatrix} 2b-1 & -5 \\ a+b & c \end{bmatrix}$, then the value of $4(a+b-c)(a-b+c)$ is

A -15

B 0

C 45/4

D -21

$Adj\ A = \begin{bmatrix} b & -5 \\ -a & 3 \end{bmatrix} = \begin{bmatrix} 2b-1 & -5 \\ a+b & c \end{bmatrix}$

$b = 2b-1$

$b = 1$

$c = 3$

$-a = a+b$

$2a+b = 0$

$a = -\frac{1}{2}$

$\Rightarrow 4\left[-\frac{1}{2}+1-3\right]\left[-\frac{1}{2}-1+3\right]$

$\Rightarrow 4\left[-\frac{1}{2}-2\right]\left[-\frac{1}{2}+2\right]$

$\Rightarrow -4\left[4-\frac{1}{4}\right]$

$\Rightarrow -15$

Question: CUET 2026 PYQs

If A and B are non-singular matrices of order n, then [where $A^{\wedge}T$ denotes transpose of A]. Match List-I with List-II

List-I		List-II	
(A)	adj(AB)	(I)	$\|A\|^{n-1}$
(B)	adj(adjA)	(II)	(adjB)(adjA)
(C)	adj(A^T)	(III)	$(adjA)^T$
(D)	|adjA|	(IV)	$\|A\|^{n-2}A$

Choose the correct answer from the options given below:

A (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

B (A) - (II), (B) - (IV), (C) - (III), (D) - (I)

C (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

D (A) - (II), (B) - (I), (C) - (IV), (D) - (III)

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 1 & 2 & -1 \\ -1 & 1 & 2 \\ 2 & -1 & 1 \end{bmatrix}$, then $|adj(adj\ A)|$ is equal to

$r = 2$

$|A|^{(2)^2} \Rightarrow |A|^4$

A) 14

B) 14^2

C) 14^3

D) 14^4

Question: CUET 2026 PYQs

CBSE 2025 SP9. — (1)

M is a square matrix of order 3. If $M(adjM) = \begin{bmatrix} 5 & 0 & 0 \\ 0 & 5 & 0 \\ 0 & 0 & 5 \end{bmatrix}$, **then the value of** $|M| + |adj\ M|$ **is equal to**

3*3

$M \cdot (AdjM) = 5I$

$|M| = 5$

$\Rightarrow |M| + |M|^2$

$5 + 5^2$

$\Rightarrow 30$

(A) 125

(B) 30

(C) 25

(D) 50

Question: CUET 2026 PYQs

If A is a square matrix of order n, then Match the LIST-I with LIST-II

LIST-I		LIST-II	
A.	$\|A\ (adj\ A)\|$	I.	$\|A\|^{n-1}$
B.	adj (adj A)	II.	$\|A\|I$, where I is the identity matrix of order n
C.	$\|adj\ A\|$	III.	$\|A\|^{n-2}A$
D.	A(adj A)	IV.	$\|A\|^{n}$

Choose the correct answer from the options given below:

(A) A-IV, B-III, C-I, D-II

(B) A-I, B-II, C-IV, D-III

(C) A-I, B-III, C-IV, D-II

(D) A-III, B-IV, C-I, D-II

$|A \cdot Adj A| \Rightarrow |A| \cdot |Adj A|$

$\rightarrow |A| \cdot |A|^{(n-1)}$

$\rightarrow |A|^{n}$

Question: CUET 2026 PYQs

If A is a 3-rowed square matrix and $|A| = 5$, then $|adjA|$ is equal to

$\Rightarrow |A|^2$

A) 5

B) 25 ✓

C) 125

D) 225

Question: CUET 2026 PYQs

If A is a non-singular square matrix of order n, then which of the following are TRUE ?

A. $|adj\ A| = |A|^{n-1}$

B. $|adj\ A| = |A|^{n-2}$

C. $|adj(adj\ A)| = |A|^{(n-2)^2}$

D. $|adj(adj\ A)| = |A|^{(n-1)^2}$

Choose the correct answer from the options given below:

A. B and C only

B. A and C only

C. B and D only

D. A and D only

Question: CUET 2026 PYQs

Match the LIST-I with LIST-II

List-I:	List-II:
A is given matrix	$\|adj(adjA)\|$
(A) Order of A = 2 x 2 and $\|A\| = 3$	(I) 3
(B) Order of A = 3 x 3 and $\|A\| = 2$	(II) 1
(C) Order of A = 4 x 4 and $\|A\| = 1$	(III) 16
(D) Order of A = 2 x 2 and $\|A\| = 4$	(IV) 4

$\Rightarrow |A|^{(m-1)^2}$ $\Rightarrow |A| = 3$

$(2)^4 = 16$

(1)

Choose the correct answer from the options given below:

A (A) - (I), (B) - (III), (C) - (IV), (D) - (II)

B (A) - (II), (B) - (I), (C) - (III), (D) - (IV)

C (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

D (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

Question: CUET 2026 PYQs

Match the LIST-I with LIST-II

List-I: Matrix A	List-II: $\lvert adjA \rvert$ → $\lvert A \rvert$
(A) $\begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$ (II)	(I) 2
(B) $\begin{bmatrix} 3 & 0 \\ 1 & 5 \end{bmatrix}$ (III)	(II) 5
(C) $\begin{bmatrix} 6 & -1 \\ 5 & 3 \end{bmatrix}$ (IV)	(III) 15
(D) $\begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ (I)	(IV) 23

Choose the correct answer from the options given below:

A (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

B (A) - (II), (B) - (IV), (C) - (III), (D) - (I)

C (A) - (III), (B) - (II), (C) - (IV), (D) - (I)

D (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

QUESTION - CBSE SPQs 2025 PYQs

Q. If for a square matrix A, $A.(\text{adj } A) = \begin{bmatrix} 2025 & 0 & 0 \\ 0 & 2025 & 0 \\ 0 & 0 & 2025 \end{bmatrix}$, then the value of $|A| + |\text{adj } A|$ is equal to:

A 1

B $2025 + 1$

C $(2025)^2 + 45$

D $2025 + (2025)^2$

SSR SIR

QUESTION – CUET 2022 PYQS

Q. If A be any matrix of order 3 and $[A] = 5$, where $[A]$ denotes the determinant of A. then the value of $[adj.(adjA)]$

A 25

B 125

C 625

D 5

$n=2$

$|A|^{(2)^2}$

$\Rightarrow |A|^4$

$\Rightarrow 625$

C

QUESTION – CUET 2022 PYQS

Q. If A is a square matrix of size 3 and $|A| = 3\sqrt{3}$, then value of λ for which $|2\lambda\, adj\,(3A)| = 1000$ is

$n = 3$

$|2\lambda\, adj\,(3A)| = 1000$

$(2\lambda)^3 \left|Adj\, 3A\right| = 1000$

$8\lambda^3 \left|3A\right|^2 = 1000$

$8\lambda^3 \left[3^3 |A|\right]^2 = 1000$

$8\lambda^3 \cdot (3^3)^2 \cdot |A|^2 = 1000$

$8\lambda^3 \cdot 3^6 \cdot (3\sqrt{3})^2 = 1000$

$8\lambda^3 \cdot 3^6 \cdot 3^2 \cdot 3 = 1000$

$2^3 \cdot \lambda^3 (3)^9 = 1000$

$\lambda^3 = \dfrac{10^3}{2^3 \cdot (3^3)^3}$

$\lambda^3 = \left[\dfrac{10\ 5}{2 \cdot 3^3}\right]^3$

$\lambda = \dfrac{5}{27}$

C

A $\dfrac{5}{9}$

B $\dfrac{5}{81}$

C $\dfrac{5}{27}$

D $\dfrac{3}{7}$

QUESTION – CUET 2022 PYQS

$2^3 \cdot 3^6 \cdot 4^{12} \cdot 4^4$

$\Rightarrow 2^3 \cdot 3^6 \cdot 4^{16}$

$\Rightarrow 2^3 \cdot 3^6 \cdot (2^2)^{16}$

$\Rightarrow 2^3 \cdot 3^6 \cdot 2^{32} \Rightarrow 2^{35} \cdot 3^6$

Q. If A is square matrix of order 3, $|A| = 4$ and $|2\ \text{adj.}(3\text{adj.}(4A))| = 2^a 3^b$, then value of $a + b$ is

$2^3 \cdot (3^3)^2 \cdot |\text{Adj}\,4A|^2$

$\Rightarrow 2^3 \cdot (3)^6 \cdot \left[|4A|^2\right]^2$

$\Rightarrow 2^3 (3)^6 \cdot |4A|^4$

$\Rightarrow 2^3 \cdot 3^6 \left[4^3 |A|\right]^4$

$\Rightarrow 2^3 \cdot 3^6 \cdot 4^{12} \cdot |A|^4$

$2^3 \left| \text{Adj}\left(3\,\text{Adj}\,(4A)\right) \right|$

$\Rightarrow 2^3 \left| 3(\text{Adj}\,4A) \right|^2$

$\Rightarrow 2^3 \left[3^3 \left| \text{Adj}\,4A \right|\right]^2$

$a = 35$, $b = 6$

$a + b = 41$

C

(A) 48

(B) 41

(C) 16

(D) 12

QUESTION – CUET 2022 PYQS

Q. If A is square matrix of order 3 and $|A| = 6$, then value of $a + b$, if $|2A \text{ adj.}(3A)| = 2^a.3^b$, is :

(1) 6
(2) 15
(3) 21
(4) 41

15

C

$2^3 |A \cdot \text{Adj}3A|$

$\Rightarrow 2^3 \cdot |A| \cdot |\text{Adj}3A|$

$\Rightarrow 2^3 \cdot |A| \cdot |3A|^2$

$\Rightarrow 2^3 \cdot |A| \left[3^3 |A|\right]^2$

$\Rightarrow 2^3 \cdot 3^6 \cdot |A|^3$

$\Rightarrow 2^3 \cdot 3^6 \cdot 6^3$

$\Rightarrow 2^3 \cdot 3^6 \cdot (2*3)^3$

$\Rightarrow 2^3 \cdot 3^6 \cdot 2^3 \cdot 3^3$

$\Rightarrow 2^6 \cdot 3^9$

A 1
B 3
C 2
D 4



Inverse of a MATRIX

Invertible Matrix: Let A and B two non singular matrix of the same order, satisfying the condition

$$AB = I_n = BA.$$

$$\begin{bmatrix} A^{-1} = B \\ B^{-1} = A \end{bmatrix}$$

In such a case, we say that the inverse of matrix A is B and & inverse of matrix B is A

$$\begin{bmatrix} (\text{Virat}) \cdot (\text{Modi}) = I \\ (\text{Virat})^{-1} = \text{Modi} \\ \& \quad (\text{Modi})^{-1} = \text{Virat} \end{bmatrix}$$

i.e.

$$A^{-1} = \text{B.}$$

&

$$B^{-1} = \text{A.}$$

QUESTION - NCERT

$A(I - A) = I$

$A^{-1} = I - A$

If $A^2 - A + I = 0$, then the inverse of A is-

(A) $I - A$

(B) $A - I$

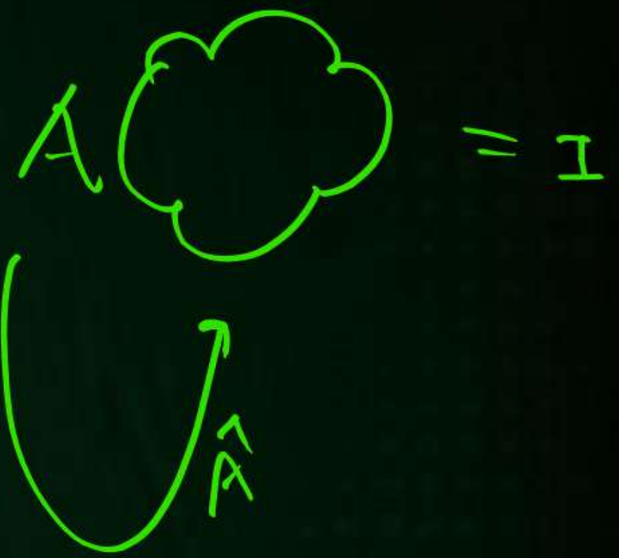
(C) A

(D) $A + I$

$I = A - A^2$

$I = A \cdot I - A^2$

$I = A[I - A]$.



Question: CUET 2026 PYQs

If a matrix A is non-singular matrix of order 2×2 such that $3A^3 + 2A^2 + 5A + I = O$, where I is 2×2 identity matrix and O is 2×2 zero matrix, then A^{-1} is

$$3A^3 + 2A^2 + 5A + I = O$$

$$I = -3A^3 - 2A^2 - 5A \cdot I$$

$$I = A\left[-3A^2 - 2A - 5I\right]$$

$$A\left(-3A^2 - 2A - 5I\right) = I$$

$$\vec{A} = -3A^2 - 2A - 5I$$

(A) $3A^2 + 2A + 5$

(B) $3A^2 + 2A + 5I$

(C) $-[3A^2 + 2A + 5I]$

(D) $3A^2 - 2A - 5I$

QUESTION - CUET 2022 PYQs

Q If square matrix A satisfies $A^3-8A^2+5A+11I=0$ and $A^{-1}=\alpha A^2+\beta A+\gamma I$, then value of $\alpha+\beta+\gamma$ is

A $\frac{1}{11}$

B $\frac{2}{11}$

C $\frac{-2}{11}$

D $\frac{7}{11}$

$$11I = -A^3+8A^2-5A$$

$$I = \frac{1}{11}\left[-A^3+8A^2-5A\cdot I\right]$$

$$I = A\cdot\frac{1}{11}\left[-A^2+8A-5I\right]$$

$$I = A\cdot\left[\frac{-1}{11}A^2+\frac{8}{11}A-\frac{5}{11}I\right]$$

$$A\left(\frac{-1}{11}A^2+\frac{8}{11}A-\frac{5}{11}\right)=I$$

$$A^{-1}=\frac{-1}{11}A^2+\frac{8}{11}A-\frac{5}{11}$$

$\alpha=\frac{-1}{11}$ $\beta=\frac{8}{11}$ $\gamma=\frac{-5}{11}$

$$\alpha+\beta+\gamma=\frac{2}{11}$$

Question – CBSE 2024 PYQs

If inverse of matrix $\underbrace{\begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix}}_{A}$ is the matrix $\underbrace{\begin{bmatrix} 1 & 3 & 3 \\ 1 & \lambda & 3 \\ 1 & 3 & 4 \end{bmatrix}}_{B}$, then value of λ is:

$\because AB = I$

$\begin{bmatrix} A^{-1} = B \\ B^{-1} = A \end{bmatrix}$

If $A^{-1} = B$

$AB = I$

$|2 - 3\lambda = 0$

$\lambda = 4$

$A^{-1} = B$

$AB = I$

$\begin{bmatrix} 21 - 3\lambda - 9 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

$\begin{bmatrix} 7 & -3 & -3 \\ -1 & 1 & 0 \\ -1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 & 3 \\ 1 & \lambda & 3 \\ 1 & 3 & 4 \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

A. -4

B. 1

C. 3

D. 4



Properties of Matrix Inverse

(I) $(\vec{A})^{\vec{-1}} = A$

(II) $A \cdot \vec{A} = \vec{A} \cdot A = I$

(III) $\because A \cdot \vec{A} = I$

$|A \cdot \vec{A}| = |I|$

$|A| \cdot |\vec{A}| = 1$

$\# \boxed{|\vec{A}| = \frac{1}{|A|}}$

(IV) $(A \pm B)^{\vec{-1}} \neq \vec{A} \pm B^{-1}$

(V) $(A \cdot B)^{\vec{-1}} = \vec{B} \cdot \vec{A}^{-1}$

(VI) $(A \cdot B \cdot C)^{\vec{-1}} = \vec{C} \cdot \vec{B} \cdot \vec{A}^{-1}$

(VII) $(A^T)^{-1} = (\vec{A})^T$ { Transpose & Inverse Can be Interchange]

(VIII) $(A^n)^{-1} = (\vec{A})^n$ [Power & Inv Can be Interchange]

(VIII) $(k\vec{A}) = \frac{1}{k}\vec{A}$ [KER]

Question – CBSE 2025 PYQs [MCQS]

If A and B are invertible matrices of order 3×3 such that $\det(A) = 4$ and $\det[(AB)^{-1}] = \frac{1}{20}$, then $\det(B)$ is equal to :

A $\frac{1}{20}$

B $\frac{1}{5}$

C 20

D 5 ✓

$|(AB)^{-1}| = \frac{1}{20}$

$|\vec{B} \cdot \vec{A}^{-1}| = \frac{1}{20}$

$|\vec{B}| \cdot |\vec{A}^{-1}| = \frac{1}{20}$

$\frac{1}{|B|} \cdot \frac{1}{|A|} = \frac{1}{20}$

$|B| \cdot |A| = 20$

$4|B| = 20$

$|B| = 5$

Question

If A and B are invertible square matrices of the same order, then which of the following is not correct?

[(CBSE 2022, 2019)]

A $|AB^{-1}| = \frac{|A|}{|B|}$

B $|(AB)^{-1}| = \frac{1}{|A||B|}$

C $(AB)^{-1} = B^{-1}A^{-1}$

D $(A+B)^{-1} = B^{-1} + A^{-1}$



IMP NOTE 1

❖ If A is **Non Singular matrix** then ⇔ **A^{-1} Exists**

If $|A| \neq 0 \Leftrightarrow \vec{A}$ Exist

❑ If A is **Singular matrix** then ⇔ **A^{-1} Does not Exists**

If $|A| = 0 \Leftrightarrow \vec{A}$ DNE.



Question: CUET 2026 PYQs

2023.

Let $A = \begin{bmatrix} 1 & -2 & 3 \\ 1 & 2 & 1 \\ \lambda & 2 & -3 \end{bmatrix}$. If A^{-1} does not exist, then $\lambda =$

$|A| = 0$

A) -2

B) 2

C) 1

D) -1

$1[-6-2] + 2[-3-\lambda] + 3[2-2\lambda] = 0$

$-8 - 6 - 2\lambda + 6 - 6\lambda = 0$

$-8 - 8\lambda = 0$

$\lambda = -1$

QUESTION - CUET 2023 PYQs

Let $A = \begin{bmatrix} 1 & -2 & 3 \\ 1 & 2 & 1 \\ \lambda & 2 & -3 \end{bmatrix}$. If A^{-1} does not exist, then $\lambda =$

A -2

B 2

C 1

D -1



IMP NOTE 2

❖ Cancellation LAW

❖ If A is Non Singular matrix then ⇔ A^{-1} Exists

Let $A \cdot B = AC$ —①

& A is Non Singular ⇔ A^{-1} Exist

Pre-Multply by A^{-1} both side Im Eq①

$A^{-1} A \cdot B = A^{-1} \cdot A \cdot C$.

$I \cdot B = I \cdot C$

$\boxed{B = C}$

If $AB = AC$ & A is Non-Singular Then Cancelln law Holds True Im Matrix Multpn.





IMP NOTE 3

❖ Inverse Proof

❖ If A is Non Singular matrix then ⇔ A^{-1} Exists

$\because \quad A(\text{Adj}A) = |A| \cdot I_n \quad \sim (1)$

$\because$ Let A is (NS) ⇔ A^{-1} Exist

Pre-Multiply by A^{-1} both side

$A^{-1} \cdot A \cdot (\text{Adj}A) = A^{-1} \cdot |A| \cdot I$

$I(\text{Adj}A) = (A^{-1} \cdot I) \cdot |A|$

$\Rightarrow (\text{Adj}A) = (A^{-1}) \cdot |A|$

$A^{-1} = \dfrac{\text{Adj}A}{|A|}$



IMP NOTE 4

❖ **If we have a diagonal Matrix then**

Let $A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$

$\sim$

$\vec{A} = \begin{bmatrix} 1/a & 0 & 0 \\ 0 & 1/b & 0 \\ 0 & 0 & 1/c \end{bmatrix}$

$|A| = abc$

$\text{Adj}A = \begin{bmatrix} bc & 0 & 0 \\ 0 & ac & 0 \\ 0 & 0 & ab \end{bmatrix}_{3\times3}$

Question – CUET 2025 PYQs

#Q. If x, y, z are non-zero numbers, the the inverse of matrix $A = \begin{bmatrix} x & 0 & 0 \\ 0 & y & 0 \\ 0 & 0 & z \end{bmatrix}$ is

A $\begin{bmatrix} \frac{1}{x} & 0 & 0 \\ 0 & \frac{1}{y} & 0 \\ 0 & 0 & \frac{1}{z} \end{bmatrix}$

B $\begin{bmatrix} \frac{1}{yz} & 0 & 0 \\ 0 & \frac{1}{xz} & 0 \\ 0 & 0 & \frac{1}{xy} \end{bmatrix}$

C $\begin{bmatrix} \frac{1}{x^2yz} & 0 & 0 \\ 0 & \frac{1}{xy^2z} & 0 \\ 0 & 0 & \frac{1}{xyz^2} \end{bmatrix}$

D $\begin{bmatrix} \frac{1}{xyz} & 0 & 0 \\ 0 & \frac{1}{xyz} & 0 \\ 0 & 0 & \frac{1}{xyz} \end{bmatrix}$

QUESTION- 5 [1 MARKS]

Q. The inverse of the matrix $\begin{bmatrix} 3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{bmatrix}$ is...

A $\begin{bmatrix} 0 & 0 & 3 \\ 0 & 2 & 0 \\ 5 & 0 & 0 \end{bmatrix}$

B $\begin{bmatrix} \frac{1}{3} & 0 & 0 \\ 0 & \frac{1}{2} & 0 \\ 0 & 0 & \frac{1}{5} \end{bmatrix}$

C $\begin{bmatrix} -\frac{1}{3} & 0 & 0 \\ 0 & -\frac{1}{2} & 0 \\ 0 & 0 & -\frac{1}{5} \end{bmatrix}$

D $\begin{bmatrix} -3 & 0 & 0 \\ 0 & -2 & 0 \\ 0 & 0 & -5 \end{bmatrix}$

Question – CUET 2025 PYQs

#Q. If $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$, then A^{-1} is equal to

A $\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$

B $\begin{bmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

C $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \end{bmatrix}$

D $\begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} \frac{3}{5} & \frac{4}{5} \\ x & \frac{3}{5} \end{bmatrix}$ & given that $A^T = A^{-1}$, then the value of x is:

$|A^T| = |A^{-1}|$

$|A| = \frac{1}{|A|} \Rightarrow |A|^2 = 1$

$\left(\frac{9}{25} - \frac{4x}{5}\right)^2 = 1$

$\frac{9}{25} - \frac{4x}{5} = 1$

$\frac{9 - 20x}{25} = 1$

$9 - 20x = 25$

$-16 = 20x$

$x = -4/5$

(A) $\frac{-4}{5}$

(B) $\frac{-3}{5}$

(C) $\frac{3}{5}$

(D) $\frac{4}{5}$

$\frac{9}{25} - \frac{4x}{5} = -1$

$\frac{(9 - 20x)}{25} = -1$

$(9 - 20x) = -25$

$20x = 34$

$x = 17/10$

Question: CUET 2026 PYQs

Let $A = \begin{bmatrix} 1 & -3 \\ 1 & 2 \end{bmatrix}$, $B = \begin{bmatrix} 4 & 6 \\ -2 & 2 \end{bmatrix}$ and C be a matrix such that $C = AB$. Then $|(BC)^{-1}|$ is equal to

(A) 0.5

(B) 0.05

(C) 0.005

(D) 0.0005

$|B| = 8 + 12 = 20$

$|A| = 2 + 3 = 5$

$|C| = |A| \cdot |B|$

$\Rightarrow (20)(5)$

$|\vec{C} \cdot \vec{B}|$

$\Rightarrow |\vec{C}| \cdot |\vec{B}|$

$\Rightarrow \frac{1}{|C|} \cdot \frac{1}{|B|}$

$\Rightarrow \frac{1}{(20)(5)(20)}$

$\Rightarrow \frac{1}{(100)(20)} \Rightarrow \frac{1}{2000}$

Question: CUET 2026 PYQs

If $P = \frac{1}{14}\begin{bmatrix} 3 & 2 \\ -4 & 2 \end{bmatrix}$ and $P^{-1} = \begin{bmatrix} x & -2 \\ 4 & y \end{bmatrix}$, then the value of x and y respectively are

$\because P \cdot P^{-1} = I$

(A) -3 and -2

(B) -2 and 3

(C) 3 and 2

(D) 2 and 3

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 0 & 3 \\ 2 & 0 \end{bmatrix}$ and $A^{-1} = K(adjA)$, then the value of K is

A $-\frac{1}{6}$

B 6

C $\frac{1}{6}$

D -6

$A^{-1} = \frac{1}{|A|} \cdot (Adj A) = k \cdot (Adj A)$

$|A| = 0 - 6$

$= -6$

$k = \frac{1}{|A|} = \frac{-1}{6}$

Question: CUET 2026 PYQs

For any invertible matrix A, which of the following is NOT true.

$(k \cdot A)^{-1} = \frac{1}{k} \cdot A^{-1}$

A is NS. $\rightarrow |A| \neq 0$

(A) $|A| \neq 0$ ✓

(B) $(A')^{-1} = (A^{-1})'$ ✓

(C) $(adjA)^{-1} = |A|A$ ✗

(D) $|A^{-1}| = |A|^{-1}$ ✓

$A^{-1} = \frac{AdjA}{|A|}$

$\left[\frac{|A|}{k} \cdot A^{-1}\right]^{-1} = (AdjA)^{-1}$

$\frac{1}{|A|}(A^{-1})^{-1} = (AdjA)^{-1}$

$$\frac{A}{|A|} = (AdjA)^{-1}$$

Question: CUET 2026 PYQs

Which of the following matrices are invertible?

(A) $\begin{bmatrix} 2 & 2 \\ 3 & 3 \end{bmatrix}$

(B) $\begin{bmatrix} 2 & 3 \\ 3 & 2 \end{bmatrix}$

(C) $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$

(D) $\begin{bmatrix} 3 & 3 \\ 3 & 3 \end{bmatrix}$

Choose the correct answer from the options given below:

A. (A) and (B) only

B. (A) and (C) only

C. (B) and (D) only

D. (B) and (C) only

Question – CUET 2025 PYQs

#Q. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$, be such that $A^{-1} = KA$, then the value of K is:

- A. 19
- B. 1/19
- C. 0
- D. −19

$$\text{Adj}A = \begin{bmatrix} -2 & -3 \\ -5 & 2 \end{bmatrix}$$

$$|A| = -4 - 15 = -19$$

$$A^{-1} = -\frac{1}{19}\begin{bmatrix} -2 & -3 \\ -5 & 2 \end{bmatrix}$$

$$A^{-1} = \frac{1}{19}\begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$$

$$A$$

$$A^{-1} = \frac{1}{|A|}\cdot A = K \cdot A \Rightarrow K = \frac{1}{19}$$

Question – CUET 2025 PYQs

#Q. If P and Q are non-singular square matrices of the same order, then $(PQ^{-1})^{-1}$ equals

$(Q^{-1})^{-1} \cdot P^{-1} \Rightarrow Q \cdot P^{-1}$

A PQ

B $P^{-1}Q$

C $P^{-1}Q^{-1}$

D QP^{-1}

Question – CUET 2025 PYQs

#Q. If A and B are invertible matrices of the same order, then $(AB)^{-1}$ is equal to

A $A^{-1}B^{-1}$

B $A^{-1}B$

C $B^{-1}A^{-1}$

D AB^{-1}

Question – CUET 2025 PYQs

#Q. If A is a 3×3 matrix such that $|adj\ A| = 9$ and $|kA^{-1}| = 9$, then the value of k are:

A. ± 1

B. $\pm 1/3$

C. ± 3

D. $\pm 1/9$

$|A|^2 = 9$

$|A| = \pm 3$

$k^3 \cdot |A^{-1}| = 9$

$k^3 \cdot \frac{1}{|A|} = 9$

$k^3 = 9|A| = \pm 27$

$k = \pm 3$

Question – CBSE 2025 PYQs [MCQS]

If A and B are invertible matrices, then which of the following is not correct?

A $(A + B)^{-1} = B^{-1} + A^{-1}$

B $(AB)^{-1} = B^{-1} A^{-1}$

C $\text{adj}(A) = |A|A^{-1}$

D $|A|^{-1} = |A^{-1}|$

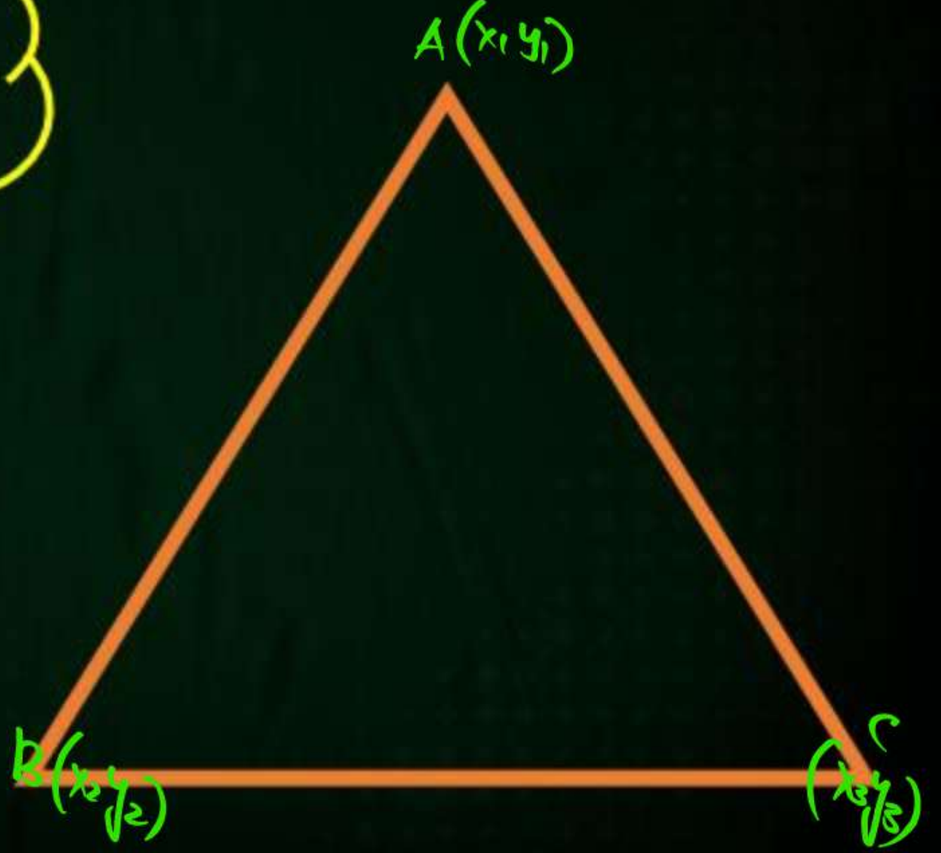
Area of a Triangle

Area of a triangle whose vertices are (x_r, y_r) ; $r = 1, 2, 3$ is

$$D = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix}$$

Mod

Det





Collinear Points

Same Line

If 3 points are collinear then,

$$\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0$$

If $\Delta = 0 \Rightarrow$ Collinear

$$D = \frac{1}{2}\begin{vmatrix} x_1 & y_1 & 1 \\ x_2 & y_2 & 1 \\ x_3 & y_3 & 1 \end{vmatrix} = 0$$

If D = 0 then the three points are collinear.

If A, B & C are Collinear Then

$$m_{AB} = m_{BC} = m_{AC}$$

$$\left(\frac{y_2-y_1}{x_2-x_1}\right) = \left(\frac{y_3-y_2}{x_3-x_2}\right) = \left(\frac{y_3-y_1}{x_3-x_1}\right)$$



Question: CUET 2026 PYQs

If area of the triangle formed by A(1, 3), B(0, 0) and C(k, 0) is 3 sq. units, then which of the following is/are TRUE?

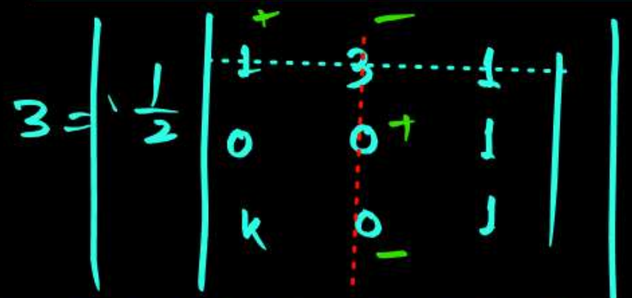
A. k = 2

B. k = -2

C. k = 3

D. k = -3

Choose the correct answer from the options given below:



$$6 = \left| -3(-k) \right|$$

$$|3k| = 6$$

$$|k| = 2$$

$$k = \pm 2$$

(A) A and C only

(B) C and D only

(C) B and D only

(D) A and B only

Question: CUET 2026 PYQs

Let A be the area of the triangle with vertices (3, 8), (5, -1) and $(k, 2)$, $k \in Z$ (set of integers). If $2A = 75$, then k is equal to:

$2 \times \frac{1}{2} |9k - 39| = 75$

$A = \left| \frac{1}{2} \begin{vmatrix} 3 & 8 & 1 \\ 5 & -1 & 1 \\ k & 2 & 2 \end{vmatrix} \right|$

$A = \left| \frac{1}{2} \left| 3(-1-2) - 8(5-k) + 1(10+k) \right| \right|$

$A = \left| \frac{1}{2} \left| -9 - 40 + 8k + 10 + k \right| \right|$

$A = \frac{1}{2} |9k - 39|$

$9k - 39 = 75$ | $9k - 39 = -75$

$9k = 114$ | $9k = -36$

$k = \frac{114}{9} \notin Z$ | $k = -4 \in Z$

(A) -4

(B) 4

(C) 13

(D) -21

Question: CUET 2026 PYQs

Let A (1, 3), B (0, 0) and C (k, 0) be three points such that area of $\triangle(ABC) = 3$ sq. units, then the value of k is:

A ± 3

B ± 2

C ± 6

D ± 4

QUESTION- 6 [1 MARKS]

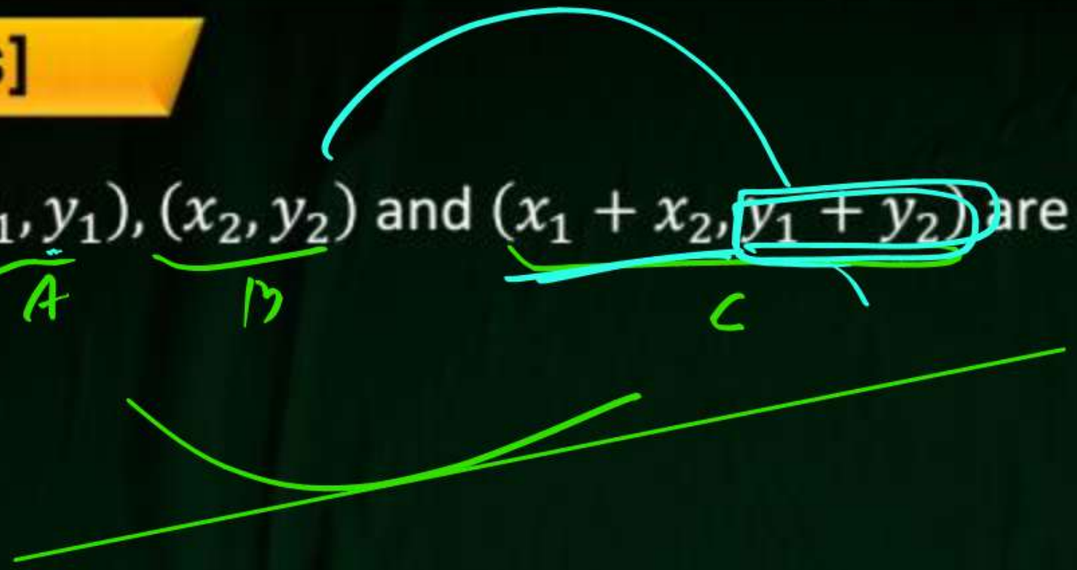
Q. If the points $(x_1, y_1), (x_2, y_2)$ and $(x_1 + x_2, y_1 + y_2)$ are collinear, then x_1y_2 is equal to

A x_2y_1

B x_1y_1

C x_2y_2

D x_1x_2



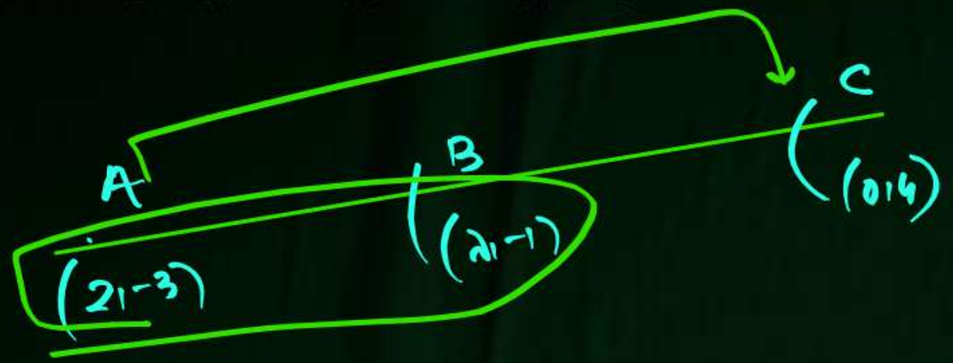
$$m_{AC} = m_{BC}$$

$$\frac{y_1 + y_2 - y_1}{x_1 + y_2 - x_1} = \frac{y_1 + y_2 - y_2}{x_1 + x_2 - x_2}$$

$$\frac{y_2}{x_2} = \frac{y_1}{x_1} \Rightarrow y_2x_1 = y_1x_2$$

QUESTION - CUET 2022/2023 PYQs

If the points $(2, -3)$, $(\lambda, -1)$ and $(0,4)$ are collinear, then the value of λ is



$m_{AB} = m_{BC} = m_{AC}$

A $\frac{-10}{7}$

B $\frac{10}{7}$

C $\frac{2}{7}$

D $\frac{7}{2}$

$$\frac{-1+3}{\lambda-2} = \frac{7}{-2}$$

$$-4 = 7\lambda - 14$$

$$\lambda = 10/7$$



Caley Hamilton Theorem

(A) ⟶ Matrix Polynomial.

(I) $|A - \lambda I| = 0$

(II) We Get An Eqn In λ

(III) $\lambda \longrightarrow A$

(Const) $\longrightarrow$ (Const) $\cdot I$

Question: CUET 2026 PYQs

If a matrix $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$ is such that $A^2 + \alpha A + \beta I = 0$, where I is identity matrix of order 2, then which of following are TRUE?

A. $\alpha = -4, \beta = 1$

B. $\alpha = 4, \beta = -1$

C. $A^{-1} = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix}$

D. $A^{-1} = \begin{bmatrix} 1 & 2 \\ 1 & 3 \end{bmatrix}$

Choose the correct answer from the options given below:

(A) B and C only

(B) B and D only ✗

(C) A and D only ✗

(D) A and C only

$|A| = 3-2 = 1$ $\quad \vec{A} =$

$Adj A = \begin{bmatrix} 1 & -2 \\ -1 & 3 \end{bmatrix} = \vec{A}$

$|A - \lambda I| = 0$

$\left| \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix} - \lambda \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \right| = 0$

$\begin{vmatrix} 3-\lambda & 2 \\ 1 & 1-\lambda \end{vmatrix} = 0$

$(3-\lambda)(1-\lambda) - 2 = 0$

$3 - 3\lambda - \lambda + \lambda^2 - 2 = 0$

$\lambda^2 - 4\lambda + 1 = 0$

$A^2 - 4A + I = 0$

$\alpha = -4$ $\quad \beta = 1$

QUESTION - CUET 2023 PYQs

C

If $A = \begin{pmatrix} 1 & 0 \\ -1 & 7 \end{pmatrix}, I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, and $A^2 = 8A + KI$ the value of K is :

A 7

B −7

C 8

D −8

$|A - \lambda I| = 0$

$\left| \begin{bmatrix} 1 & 0 \\ -1 & 7 \end{bmatrix} - \lambda \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \right| = 0$

$\begin{vmatrix} 1-\lambda & 0 \\ -1 & 7-\lambda \end{vmatrix} = 0$

$(1-\lambda)(7-\lambda) = 0$

$(\lambda-1)(\lambda-7) = 0$

$\lambda^2 - 8\lambda + 7 = 0$

$A^2 - 8A + 7I = 0$

$A^2 = 8A - 7I$

$8A + kI$

$k = -7$

QUESTION - CUET 2023 PYQs

If $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$, then $A^2 - 5A + 7I =$

A. 0

B. I

C. 2I

D. 3I

$|A - \lambda I| = 0$

$\left| \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix} - \lambda \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \right| = 0$

$\begin{vmatrix} 3-\lambda & 1 \\ -1 & 2-\lambda \end{vmatrix} = 0$

$(3-\lambda)(2-\lambda) + 1 = 0$

$6 - 3\lambda - 2\lambda + \lambda^2 + 1 = 0$

$\lambda^2 - 5\lambda + 7 = 0$

$A^2 - 5A + 7I = 0$



Elementary Transformation

Row by Row Method

(I) $R_i \rightarrow R_i + \lambda R_j$

(II) $R_i \rightarrow \lambda R_i$

$\lambda \neq 0$

Column by Column Method

(I) $C_i \rightarrow C_i + \lambda C_j$

(II) $C_i \rightarrow \lambda C_i$

$\lambda \neq 0$

Question: CUET 2026 PYQs

The value of $\begin{vmatrix} x & a & a \\ a & x & a \\ a & a & x \end{vmatrix}$ **is equal to:**

(A) $(x+2a)(x-a)$

(B) $(x+2a)(x-a)^2$ ✓

(C) $(x+2a)(x+a)^2$

(D) $(x+2a)(x+a)$

$C_1 \to C_1+C_2+C_3$

$$\begin{vmatrix} x+2a & a & a \\ x+2a & x & a \\ x+2a & a & x \end{vmatrix}$$

$$(x+2a)\begin{vmatrix} 1 & a & a \\ 1 & x & a \\ 1 & a & x \end{vmatrix}$$

$R_1 \to (R_1-R_2)$

$$(x+2a)\begin{vmatrix} 0 & (a-x) & 0 \\ 1 & x & a \\ 1 & a & x \end{vmatrix}$$

$\Rightarrow (x+2a)(a-x)(-1)[x-a]$

$\Rightarrow (x+2a)(x-a)(x-a)$

$\Rightarrow (x+2a)(x-a)^2$ ✓

Q)

$$\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = (x-y)(y-z)(z-x)$$

$R_1 - (R_1 - R_2)$

$$\Rightarrow \begin{vmatrix} 0 & (x-y) & x^2-y^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix}$$

$R_2 - (R_2 - R_3)$

$$\Rightarrow \begin{vmatrix} 0 & (x-y) & x^2-y^2 \\ 0 & (y-z) & y^2-z^2 \\ 1 & z & z^2 \end{vmatrix}$$

$$\Rightarrow 1\left[(x-y)(y^2-z^2)\right] - (x^2-y^2)(y-z)$$

$$(x-y)(y-z)(y+z) - (x-y)(x+y)(y-z)$$

$$\Rightarrow (x-y)(y-z)\left[y+z-(x+y)\right]$$

$$\Rightarrow (x-y)(y-z)(z-x)$$

Q16

$$\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix} = (x+y+z)(x-y)(y-z)(z-x)$$

$R_1 \to (R_1 - R_2)$

$R_2 \to (R_2 - R_3)$

$$\begin{vmatrix} 0 & x-y & x^3-y^3 \\ 0 & y-z & y^3-z^3 \\ 1 & z & z^3 \end{vmatrix}$$

$$1\left[(x-y)(y^3-z^3)\right] - (y-z)(x^3-y^3)$$

$$\Rightarrow (x-y)(y-z)(y^2+z^2+yz) - (y-z)(x-y)(x^2+y^2+xy)$$

$$\Rightarrow (x-y)(y-z)\left[y^2+z^2+yz-(x^2+y^2+xy)\right]$$

$$\Rightarrow (x-y)(y-z)\left[(z^2-x^2)+(yz-xy)\right]$$

$$\Rightarrow (x-y)(y-z)\left[(z+x)(z-x)+y(z-x)\right]$$

$$\Rightarrow (x-y)(y-z)(z-x)(y+x+z)$$

9/2022

find The Value

$$\frac{\begin{vmatrix} 1 & x & x^3 \\ 1 & y & y^3 \\ 1 & z & z^3 \end{vmatrix}}{\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix}} = \frac{(x+y+z)\cancel{(x-y)(y-z)(z-x)}}{\cancel{(x-y)(y-z)(z-x)}} \Rightarrow x+y+z$$

a) $(x-y)(y-z)(z-x)$

b) 1

c) $(x+y+z)$

d) 0

Q1 / 2022

$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$$

$C_1 \to C_1+C_2+C_3$

$$\Rightarrow \begin{vmatrix} (a+b+c) & b & c \\ (a+b+c) & c & a \\ (a+b+c) & a & b \end{vmatrix}$$

$$\Rightarrow (a+b+c) \begin{vmatrix} 1 & b & c \\ 1 & c & a \\ 1 & a & b \end{vmatrix}$$

$\begin{bmatrix} R_1 \to R_1-R_2 \\ R_2 \to R_2-R_3 \end{bmatrix}$

$$(a+b+c) \begin{vmatrix} 0 & b-c & c-a \\ 0 & c-a & a-b \\ 1 & a & b \end{vmatrix}$$

$$\Rightarrow (a+b+c)\left[(b-c)(a-b)-(c-a)^2\right]$$

$$\Rightarrow (a+b+c)\left[ba-b^2-ca+cb-(c^2+a^2-2ca)\right]$$

$$\Rightarrow (a+b+c)\left[ab-b^2+bc-c^2-a^2+ca\right]$$

$$\Rightarrow (a+b+c)\left[ab+bc+ca-a^2-b^2-c^2\right]$$

$$\Rightarrow -(a+b+c)\left[a^2+b^2+c^2-ab-bc-ca\right] \quad -(1)$$

$$\Rightarrow -\frac{(a+b+c)}{2}\left[\underline{\underline{2a^2}}+2b^2+2c^2-2ab-2bc-2ca\right]$$

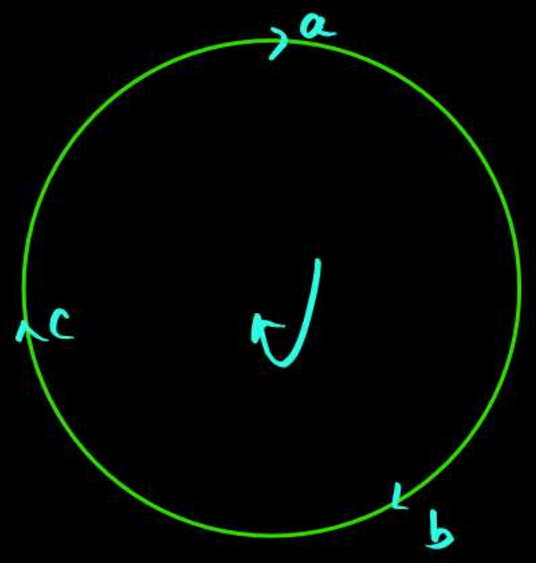
$$\Rightarrow -\frac{(a+b+c)}{2}\left[(a^2+b^2-2ab)+(b^2+c^2-2bc)+(c^2+a^2-2ca)\right]$$

$$\Rightarrow -\frac{(a+b+c)}{2}\left[(a-b)^2+(b-c)^2+(c-a)^2\right] \sim (2)$$

$\Rightarrow (a+b+c)\left[ab+bc+ca-a^2-b^2-c^2\right]$

$\Rightarrow \left(a^2b+abc+a^2c-a^3-ab^2-ac^2\right)+\left(ab^2+b^2c+abc-ba^2-b^3-bc^2\right)+\left(abc+bc^2+c^2a-ca^2-cb^2-c^3\right)$

$\Rightarrow$ $3abc-a^3-b^3-c^3$



$$\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix} = 3abc - a^3 - b^3 - c^3$$

$$\Rightarrow -\frac{(a+b+c)}{2}\left[(a-b)^2 + (b-c)^2 + (c-a)^2\right]$$

$$\Rightarrow (a+b+c)\left[ab + bc + ca - a^2 - b^2 - c^2\right]$$



Solution of an Equation

SOLUTION OF EQUATIONS

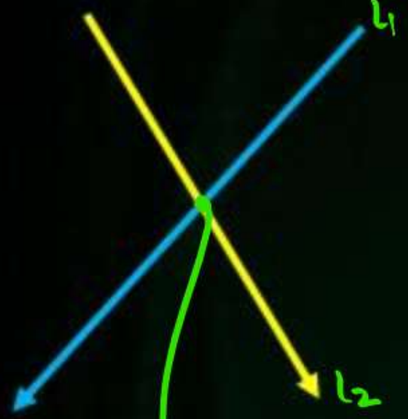
- **By Determinants Method** ✗
- **By MATRIX Method**
  - In The 2 Vari Eqn
  - In The 3 Vari Eqn



System of Linear Equation in 2 Variable equations

$L_1: a_1x + b_1y = c_1$

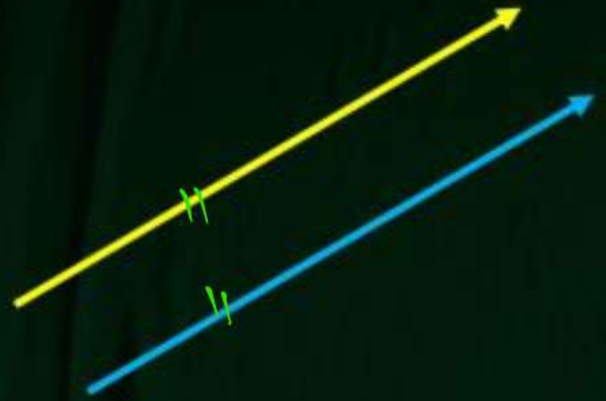
$L_2: a_2x + b_2y = c_2$



Intersecting Line

↳ Unique Soln

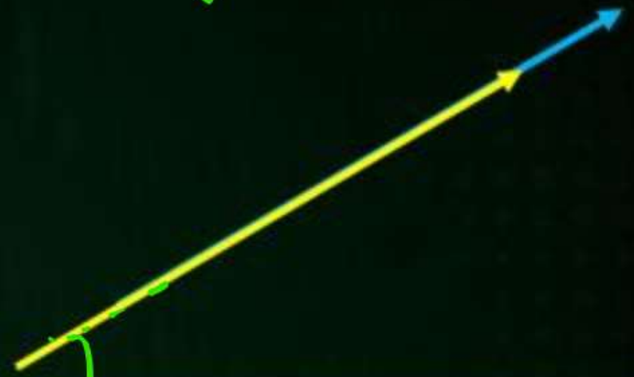
$$\frac{a_1}{a_2} \neq \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$ → Consistent



Parallel lines

↳ No Soln — Inconsistent

$$\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$$



Coincidental lines.

↳ Inf Many Soln → Consistent

$$\left[\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}\right]$$



IMP Definitions

Consistent Solutions: If system of linear equation have at least one solution

#Unique solution
#Infinitely many solutions

In Consistent Solutions: If system of linear equation have NO solution

~~#Unique solution~~
~~#Infinitely many solutions~~

Trivial Solutions: If value of all variable is Zero.

#(x,y)=(0,0)
#(x,y,z) = (0,0,0)

Non Trivial Solutions: if at least one variable is non zero.

#(x,y)=(1,0)
#(x,y,z) = (2,3,0)

Question – CUET 2025 PYQs

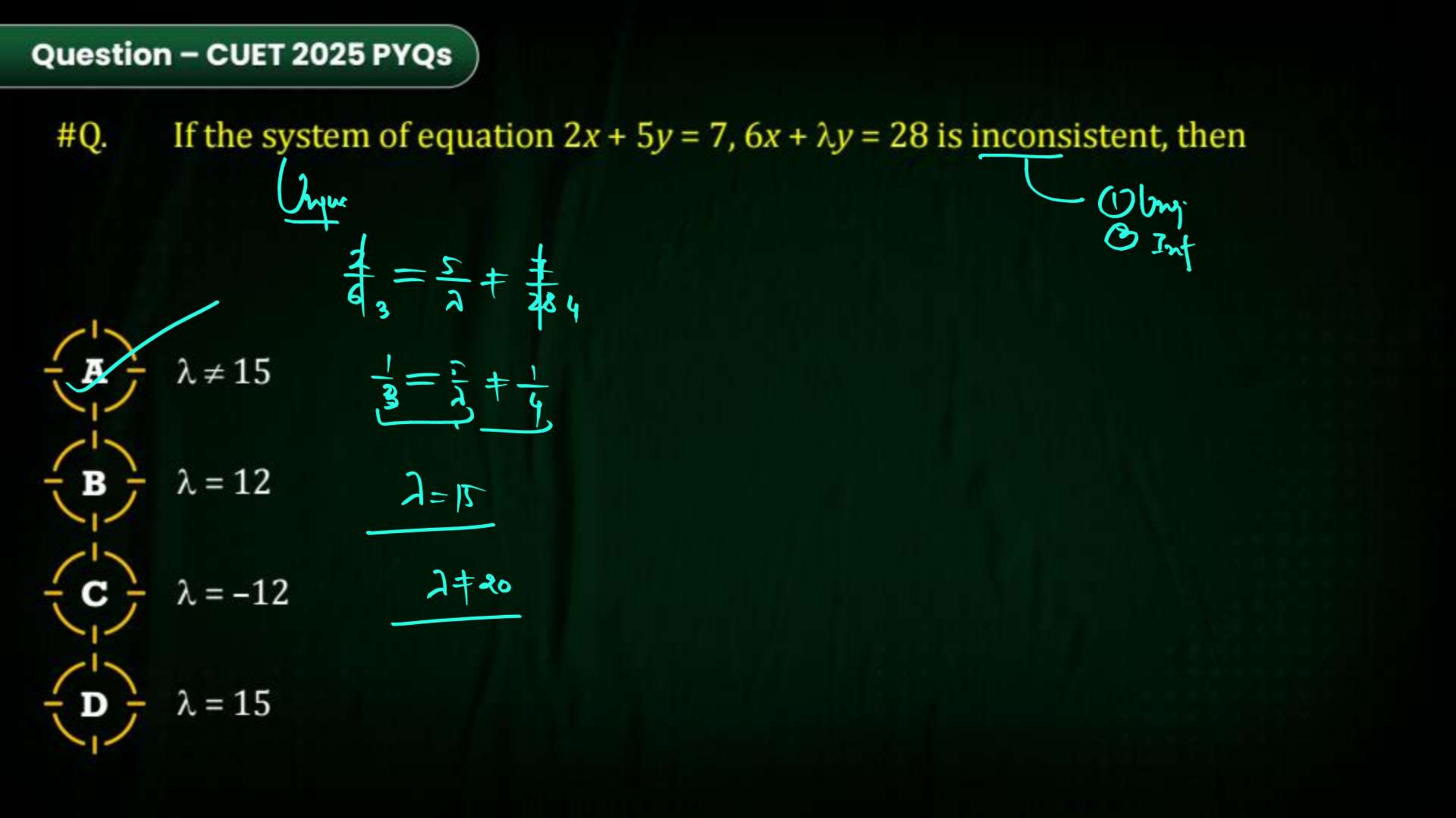
#Q. If the system of equation $2x + 5y = 7$, $6x + \lambda y = 28$ is inconsistent, then

(A) $\lambda \neq 15$

(B) $\lambda = 12$

(C) $\lambda = -12$

(D) $\lambda = 15$



Question – CUET 2025 PYQs

#Q. The system of linear equations $kx + 5y = 5$, $2x + 3y = 5$ will be consistent if

A $k \neq \frac{5}{3}$

B $k \neq 5$

C $k \neq \frac{10}{3}$

D $k = \frac{10}{3}$

System of Linear Equation in 3 Variable Equations

$$L_1: a_1x + b_1y + c_1z = d_1$$
$$L_2: a_2x + b_2y + c_2z = d_2$$
$$L_3: a_3x + b_3y + c_3z = d_3$$

$$\Rightarrow \boxed{AX = D} \quad \text{--- (1)}$$

$$A = \begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}; \quad X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \text{ & } D = \begin{bmatrix} d_1 \\ d_2 \\ d_3 \end{bmatrix}$$

Let A is Non Singular Matrix

$\Rightarrow A^{-1}$ Exist

$$A^{-1} \cdot A \cdot X = A^{-1} \cdot D$$

$$I \cdot X = A^{-1} \cdot D$$

$$\boxed{X = A^{-1} \cdot D}$$

Unique Soln

$AX = D$

If $|A| \neq 0$

↳ Unique Soln

↓

$X = A^{-1} \cdot D$

If $|A| = 0$

↓

Find $(\text{Adj}\,A) \cdot D = ?$

If $(\text{Adj}\,A) \cdot D \neq 0$

↓

No Soln

If $(\text{Adj}\,A) \cdot D = 0$

↓

Check Consistency

→ Consist : Inf

→ Incon : No Soln

Unique Soln $\Rightarrow |A| \neq 0$

Inf Many $\Rightarrow |A| = 0$

No Soln : $|A| = 0$

Question: CUET 2026 PYQs

The value/s of λ for which the system of equations

$$\lambda x + 3y - z = 1$$
$$x + 2y + z = 2$$
$$-\lambda x + y + 2z = -1$$

has unique solution is/are: (where R is set of real numbers)

(A) $\frac{7}{2}$

(B) $-\frac{7}{2}$

(C) $R - \{\frac{7}{2}\}$

(D) $R - \{-\frac{7}{2}\}$

$|A| \neq 0$

$$\begin{vmatrix} \lambda & 3 & -1 \\ 1 & 2 & 1 \\ -\lambda & 1 & 2 \end{vmatrix} \neq 0$$

$\lambda \neq$ ◯

$\lambda \in R - \{$◯$\}$

Question: CUET 2026 PYQs

The system of equation $x - y + z = 4, x - 2y - 2z = 9, 2x + y + \alpha z = 1$ has unique solution then value (/s) of α is (/are) (where R is set of real numbers)

$|A| \neq 0$

(A) $\alpha \in R$

(B) $\alpha \in R \sim \{-11\}$

(C) 11

(D) $\alpha \in R \sim \{11\}$

Question: CUET 2026 PYQs

If the system of equation

$$\lambda x + 3y - z = 4$$
$$x + 2y + z = 20$$
$$-\lambda x + y + 2z = -5$$

does not possess a unique solution, then

(A) $\lambda = \frac{7}{2}$

(B) $\lambda = -\frac{7}{2}$

(C) $\lambda \neq -\frac{7}{2}$

(D) $\lambda \neq \frac{7}{2}$

→ Inf Nu ⟹ $|A| = 0$

Question: CUET 2026 PYQs

If $A = \begin{bmatrix} 4 & -1 & \lambda \\ 2 & 0 & 6 \\ 1 & -2 & 7 \end{bmatrix}$, then $\frac{1}{2}A^{-1}$ exist if

$|A| \neq 0$

(A) $\lambda \neq 7$

(B) $\lambda \in (0, 15)$

(C) $\lambda \neq 14$

(D) $\lambda = 14$

Question: CUET 2026 PYQs

The value of λ for which the following system of equations has no solution is

$$x + y + 2z = 4$$
$$2x + y + 3z = 5$$
$$x + 3y + \lambda z = 7$$

(A) 4

(B) -4

(C) -10

(D) 10

$$\begin{vmatrix} 1 & 1 & 2 \\ 2 & 1 & 3 \\ 1 & 3 & \lambda \end{vmatrix} = 0$$

$|A| = 0$



Quick Summary

- Determinants
- Co-factor Property
- Properties of a determinants
- Some IMP Properties of Determinant

- Adjoint
- Properties of Adjoint

- Inverse
- Properties of Inverse

- IMP Notes:

- Area of Triangle
- Collinear Points
- Caley Hemilton Theorem

- Solution of Equation

By- SSR Sir



Home Work

- Complete NCERT Chapter 4
- Complete BPPT 5.0 | 6.0
- Mock Test



By- SSR Sir


Thank
P'D'F
You
May God Watch Over You !!
~ SHASHANK SINGH RAJPUT (SSR)